LESSONS LEARNED IN UTILITY MANAGEMENT AND THE STATUS OF THE R&D PROGRAM FOLLOWING THE ACCIDENT AT THREE MILE ISLAND

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND PRODUCTION

OF THE

COMMITTEE ON
SCIENCE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

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LESSONS LEARNED IN UTILITY MANAGEMENT AND THE STATUS OF THE R&D PROGRAM FOLLOWING THE ACCIDENT AT THREE MILE ISLAND

TUESDAY, MAY 22, 1984

House of Representatives,
Committee on Science and Technology,
Subcommittee on Energy Research and Production,
Washington, DC.

The subcommittee met, pursuant to notice, at 1 p.m., in room 2318, Rayburn House Office Building, Hon. Marilyn Lloyd (chairman of the subcommittee) presiding.

Present: Representatives Lloyd, Young, and Walker; also present, Mr. Torricelli.

Staff present: Jack Dugan, staff director; David D. Clement, minority counsel; and Keith Jansen, technical consultant.

Mrs. Lloyd. The subcommittee will come to order.

Good afternoon, ladies and gentlemen. Today we will receive testimony from government and private witnesses in our review of the Three Mile Island activities which have been implemented in accordance with the memorandum of understanding signed by the Department of Energy, the Nuclear Regulatory Commission, the Electric Power and Research Institute, and General Public Utilities.

Slightly over 5 years ago, on March 28, 1979, this Nation experienced a nuclear accident which sent shock waves throughout our domestic nuclear industry that are still reverberating today. The story relating the details of that incident and the vast repercussions has been replayed many times since.

We are not here today to simply review the events of that unfortunate episode, which are known all too well by those associated in anyway with nuclear power in this country. Rather, the purpose of today's hearing is to identify what lessons have been learned in terms of changes in design and procedures resulting from the accident, to review the results of the R&D to date, and to determine the current status of the R&D program and projected schedule.

One particular issue that concerns me greatly is the utilities' efforts to raise the necessary amount of pledges to achieve the commitment threshold of $100 million. I would hope that all the nuclear utilities and related public utility commissions would value this participation. For some time, we were told that the status of the deductibility of these contributions in the eyes of the IRS was responsible for the industry's reluctance to participate. Now that the IRS has ruled favorably for the industry in that regard, I am not convinced that a great deal of restrained enthusiasm has been unleashed. On the other hand, the Japanese Federation of Electric Power Companies' interest in participating in this unique R&D opportunity clearly underscores the potential value this technology has for any nuclear utility mindful of the future.

We look forward to hearing what our witnesses have to say about the R&D, the TMI cleanup, and other related subjects, but before we begin receiving testimony I would like to call upon our ranking Republican member, Mr. Walker, who certainly has a particular interest in this subject, and I understand that you have a statement.

Mr. **WALKER**. Thank you, Madam Chairman. I do. First of all, I have a unanimous-consent request that I ask with some reluctance, given the events of the last few days, but I ask unanimous consent for taking of photographs and coverage of this hearing by the electronic media. [Laughter.]

Mrs. **LLOYD**. Without objection, so ordered. I don't want to stand in the way of progress today.

Mr. **WALKER**. Thank you, Madam Chairman.

Madam Chairman, I have a fairly lengthy statement here because I have some things that I would like to cover, so I beg that you go along with me here for a couple of minutes anyhow.

Good afternoon, Madam Chairman. I would like to join you in welcoming our witnesses to the subcommittee today. I would also like to express my deep and sincere gratitute to the chairman for the courtesy extended to me in scheduling this hearing.

Just a few weeks ago we marked the fifth anniversary of the accident at TMI. Today our hearing will focus on both the progress of the research being conducted as a part of the cleanup effort on the island, and on the numerous lessons learned in the aftermath of that accident.

I am pleased to have the opportunity to open this afternoon with good news for all the people interested in the progress of cleanup at Three Mile Island: Agreement has been reached between the General Public Utilities Nuclear Corp. and the U.S. Department of Energy to provide an additional $18 million in the current fiscal year, which will make the total cleanup expenditures for fiscal year 1984, $93 million. There has been a deep concern that the expected shortfall in funding this year could have severe consequences on the projected schedule. This additional funding should be adequate to maintain the schedule as originally planned.

Under this agreement, GPU Nuclear will advance an additional $10 million and the Department of Energy will increase its effort by $8 million. I understand that the Department of Energy will delay some noncritical work which will be conducted offsite, and that will provide $5 million, and the other $3 million will be provided by a group of Japanese utilities and industrial firms which have recently entered into a research and development agreement with us, in which they will have the opportunity to share the work and the results generated by the R&D efforts at TMI.

I am particularly glad to see the Japanese participation in this effort. Some months ago when I was in Japan on congressional business, I had the opportunity to open discussions with leaders of the Japanese industrial and governmental communities about their possible participation. Those early talks were very encouraging, and we will now see the results. I am particularly pleased because there are a number of members of this committee and of the Congress who ask: "Why we don't see more international cooperation in many of these difficult scientific and technical projects?" Well, Three Mile Island will be remembered as an example of exactly that kind of international cooperation.

Madam Chairman, I sincerely regret that we were unable to get a witness to represent the Federation of Japanese Utility Companies here this afternoon. I realize there are many difficulties in getting clearance from all the Japanese participants, but it seems to me that they have a very valuable view to share with this committee. I find it fascinating that the Japanese are able to see clearly that there is a great value in their participation halfway around the world. I think that they are to be highly commended for their participation and their ability to perceive that value. I would point out that, as in many areas recently, the Japanese are quick to see that research and development are essential, and they are quick to take advantage of the opportunity to join us in this matter.

On the other hand, American utilities continue to act as if the accident at Three Mile Island does not concern them and that there is nothing for them to learn. This attitude, which is manifested in many ways, can only reduce congressional support for our domestic nuclear industry, and will lead inevitably to a crisis in confidence which the industry and the public can ill afford at this time.

I would like to take just a moment to point out that this subcommittee does not have regulatory jurisdiction over Three Mile Island. Our jurisdiction is limited to the research and developmental aspects of the efforts there. Our attention this afternoon will be focused on how the R&D efforts are being conducted and how well the schedules are being honored. We will also be deeply interested in the views of our witnesses concerning the many changes and improvements in management, training, and operations which have been developed as a result of the intense attention given to these areas after the accident.

We have a series of witnesses this afternoon who represent some of the most knowledgeable people in the arena of nuclear operation and safety. We will be hearing from Shelby Brewer, the Assistant Secretary for Nuclear Energy, who brings to the table the considerable technological base of the U.S. Department of Energy. We will also hear from Harold Denton from the Nuclear Regulatory Commission. Mr. Denton won wide respect from the residents surrounding Three Mile Island during the hectic days following the accident for his professionalism, his dedication, and his total competence. It is a pleasure to welcome him here today.

I am also pleased to note that we have the chairman of the Nuclear Regulatory Commission Advisory Panel for the Decontamination of Three Mile Island, Mayor Art Morris of Lancaster, PA. Mayor Morris is a constituent, a good friend, and a dedicated public servant. I welcome his participation at these hearings.

Finally, I want to welcome Mr. William Kuhns, the chairman and chief executive officer of the General Public Utilities Corp. Mr.

Kuhns has seen GPU through five of the most turbulent years imaginable. While all of the problems facing GPU have not been fully resolved, the progress that has been made has been remarkable. I think I have only to point to the recent study undertaken by Adm. Hyman Rickover of the operation of the General Public Utilities to indicate how much progress has been made. Anyone who is familiar with nuclear energy should be well aware that Admiral Rickover may well be the most difficult taskmaster ever to critique an industrial operation. His report on GPU is a clear indication that the company has been well served by the stewardship of Mr. Kuhns.

Madam Chairman, I ask unanimous consent that both the original Rickover report and the followup report authored by Admiral Rickover be entered into the record of the hearing immediately following these remarks.

Mrs. LLOYD. Without objection.

Mr. WALKER. Now, Madam Chairman, I want the record to reflect that I am very thankful to the chairman for her many courtesies in calling this hearing and in inviting such an impressive collection of witnesses. I think that the result will be an interesting and informative hearing.

However, I cannot help but observe that we are missing a critical link in the area of the lessons learned. I ask unanimous consent to enter into the record at this point copies of letters from the chairman of the subcommittee to Mr. Charles Daugherty, chairman of the Edison Electric Institute, and Adm. E.P. Wilkinson, the president emeritus of the Institute of Nuclear Power Operations, inviting both of those gentlemen to appear at this hearing and to provide essential testimony.

Mrs. LLOYD. Without objection, but I believe they will be appearing at a later time.

Mr. WALKER. Thank you, Madam Chairman. That's good. I was informed that less than a week ago and within 30 minutes of each other, we were notified that neither EPI nor INPO would participate.

Madam Chairman, I cannot help but reach the conclusion that, for reasons which I do not understand, the industry has chosen to boycott this hearing. If they are going to be here later on, that's good news, because I think it's very important that we get their testimony on the record with regard to this matter.

I think that the current conduct of the Edison Electric Institute is one that we have got to be very concerned about. One of the greatest problems facing the nuclear industry today is the massive loss of public confidence. There have been a series of public opinion polls which have indicated that the average citizen of this Nation has lost confidence in the competency of the utility management, in the ability of the nuclear industry to operate in a manner which will safeguard the public health and safety and, perhaps most importantly, in the willingness of officials in the nuclear industry to be truthful and open with the public.

Mrs. LLOYD. Would the gentleman yield?

Mr. WALKER. I would be glad to yield.

Mrs. LLOYD. How would you classify their public acceptance as compared to that of the Congress?

Mr. WALKER. Excuse me?

Mrs. LLOYD. Would you put their level of public confidence at the same level as the United States Congress?

Mr. WALKER. Well, that's not a very high standard by which to be judged, I'm afraid, according to some of the public opinion polls, so I'm not certain we ought to rank the two. [Laughter.]

This committee has shown a consistent support for maintaining a nuclear option in this Nation. We have gone to great lengths to provide a research and development program through the Federal Government which will provide a basis for that option well into the next century. I find it absolutely incredible that the spokesmen for the industry we have so helped would claim that they have nothing to say to this committee.

Madam Chairman, I would like to point out that we asked each potential witness to address the same nine specific questions, and the subcommittee and staff have informed each potential witness to address those questions in which they had special expertise or information. Among those nine questions were the following:

What organizational changes have already been mandated as a result of the accident, and what additional ones are required?

Have changes in operator training already been required, and what additional changes should be mandated?

How can simulator utilization be enhanced so as to provide operator training?

What progress has been made to date in recovery efforts, and is the cleanup and related R&D progressing according to schedule?

What is the value of the information being obtained in the cleanup, and how is it being applied in the nuclear industry to enhance safety and focus R&D programs?

What are the implications of the R&D program for the source term issue, and will additional research data be forthcoming on this critical issue from the TMI program?

What is the involvement of the Government in the recovery effort to date, including management and funding of the R&D program? Does anything further need to be done at the Federal level to facilitate the cleanup process, including acceleration of the R&D program?

What has been the involvement of the nuclear industry in the cleanup, and how might it increase its involvement?

Based on your knowledge of the TMI status and cleanup activity, what recommendations would you offer the subcommittee at this time?

Those questions are important questions, I think, to the present and the future. At least six of those nine directly apply to the nuclear industry as a whole. Those are the kinds of questions that we need to have the industry come in here and talk to us about.

The only way that we will be able to make reasoned decisions on this issue will be with a full and open debate of the merits of the issue, and those merits will only become obvious with full disclosure. At a time when we ask the industry for candor, I feel as though—in their original responses, anyhow—what we got was contempt. At the time we request openness, we got obstructionism. At a time when the industry is in immediate need of building public confidence, they seem intent on destroying what little congressional support they have always been able to count on. This ostrich-like attitude can only deepen the public concern which may lead to the ultimate loss of confidence which will forever foreclose the option of nuclear power in this Nation.

Madam Chairman, I regret that in my opening remarks I may sound like something more frequently heard from some of the other committees of Congress, but I just can't believe that the industry representatives are being either this incredibly shortsighted or extraordinarily irresponsible. It seems obvious to me that unless there is a major effort from both Congress and the administration, in coordination with all sectors of the industry, aimed at restoring public confidence, the nuclear option may well find itself dead. I am afraid that when the obituary is written on the nuclear industry, it will say that this industry expired from repeated self-inflicted gunshot wounds to the foot.

Madam Chairman, I ask unanimous consent to include in the record at this point copies of letters which I am sending to the Edison Electric Institute and to the Institute of Nuclear Power Operations, informing them of my views on their refusal to testify here today, and I will add to those letters that I hope that we do have an appearance by them in the very near future. I would ask unanimous consent that my statement appear in full in the record, since I did excerpt from the full statement.

Mrs. Lloyd. Without objection.

[The prepared statement of Mr. Walker, plus letters mentioned above follow:]

OPENING REMARKS OF

REPRESENTATIVE ROBERT S. WALKER

AT A HEARING ON MAY 22, 1984 CONCERNING

LESSONS LEARNED AT THREE MILE ISLAND

BY THE SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION

UNITED STATES HOUSE OF REPRESENTATIVES

GOOD AFTERNOON, MADAM CHAIRMAN. I WOULD LIKE TO JOIN YOU IN WELCOMING OUR WITNESSES BEFORE THE SUBCOMMITTEE TODAY. I WOULD ALSO LIKE TO EXPRESS MY DEEP AND SINCERE GRATITUDE TO THE CHAIRMAN FOR THE COURTESY EXTENDED TO ME IN THE SCHEDULING OF THIS HEARING.

JUST A FEW WEEKS AGO WE MARKED THE FIFTH ANNIVERSARY OF THE ACCIDENT AT TMI. TODAY OUR HEARING WILL FOCUS ON BOTH THE PROGRESS OF THE RESEARCH BEING CONDUCTED AS A PART OF THE CLEAN-UP EFFORT ON THE ISLAND, AND ON THE NUMEROUS LESSONS LEARNED IN THE AFTERMATH OF THE ACCIDENT.

I AM PLEASED TO HAVE THE OPPORTUNITY TO OPEN THIS AFTERNOON WITH GOOD NEWS FOR ALL OF THE PEOPLE INTERESTED IN THE PROGRESS OF THE CLEAN-UP AT THREE MILE ISLAND. AGREEMENT HAS BEEN REACHED BETWEEN THE

GENERAL PUBLIC UTILITIES NUCLEAR CORPORATION AND THE UNITED STATES DEPARTMENT OF ENERGY TO PROVIDE AN ADDITIONAL $18 MILLION IN THE CURRENT FISCAL YEAR WHICH WILL MAKE THE TOTAL CLEAN-UP EXPENDITURES FOR FY-84 $93 MILLION. THERE HAS BEEN DEEP CONCERN THAT THE EXPECTED SHORTFALL IN FUNDING THIS YEAR COULD HAVE SEVERE CONSEQUENCES ON THE PROJECTED SCHEDULE. THIS ADDITIONAL FUNDING SHOULD BE ADEQUATE TO MAINTAIN THE SCHEDULE AS ORIGINALLY PLANNED.

UNDER THIS AGREEMENT GPU NUCLEAR WILL ADVANCE AN ADDITIONAL $10 MILLION, AND THE DEPARTMENT OF ENERGY WILL INCREASE ITS EFFORT BY $8 MILLION. I UNDERSTAND THAT THE DEPARTMENT OF ENERGY WILL DELAY SOME NON-CRITICAL WORK WHICH WILL BE CONDUCTED OFF-SITE AND THAT WILL PROVIDE $5 MILLION AND THE OTHER $3 MILLION WILL BE PROVIDED BY A GROUP OF JAPANESE UTILITIES AND INDUSTRIAL FIRMS WHICH HAVE RECENTLY ENTERED INTO A RESEARCH AND DEVELOPMENT AGREEMENT WITH US IN WHICH THEY WILL HAVE THE OPPORTUNITY TO SHARE THE WORK, AND THE RESULTS GENERATED BY THE R&D EFFORTS AT TMI.

I AM PARTICULARLY GLAD TO SEE JAPANESE PARTICIPATION IN THIS EFFORT. TWO YEARS AGO WHEN I WAS IN JAPAN ON CONGRESSIONAL BUSINESS I HAD THE OPPORTUNITY TO OPEN DISCUSSIONS WITH LEADERS OF THE JAPANESE INDUSTRIAL AND GOVERNMENTAL COMMUNITIES ABOUT THEIR POSSIBLE PARTICIPATION. THOSE EARLY TALKS WERE VERY ENCOURAGING AND WE WILL NOW SEE THE RESULTS. I AM PARTICULARLY PLEASED BECAUSE THERE ARE A NUMBER OF MEMBERS OF THIS COMMITTEEE, AND OF THE CONGRESS, WHO ASK WHY WE DON'T SEE MORE INTERNATIONAL COOPERATION IN MANY OF THESE DIFFICULT SCIENTIFIC AND TECHNICAL PROJECTS. WELL, THREE MILE ISLAND WILL BE

REMEMBERED AS AN EXAMPLE OF EXACTLY THAT KIND OF INTERNATIONAL COOPERATION.

MADAM CHAIRMAN, I SINCERELY REGRET THAT WE WERE UNABLE TO GET A WITNESS TO REPRESENT THE FEDERATION OF JAPANESE UTILITY COMPANIES HERE THIS AFTERNOON. I REALIZE THAT THERE ARE MANY DIFFICULTIES IN GETTING CLEARANCE FROM ALL OF THE JAPANESE PARTICIPANTS, BUT IT SEEMS TO ME THAT THEY HAVE A VERY VALUABLE VIEW TO SHARE WITH THIS COMMITTEE. I FIND IT FACINATING THAT THE JAPANESE ARE ABLE TO SEE CLEARLY THAT THERE IS GREAT VALUE TO THEIR PARTICIPATION IN A RESEARCH EFFORT HALF WAY AROUND THE WORLD. I THINK THAT THEY ARE TO BE HIGHLY COMMENDED FOR THEIR PARTICIPATION AND THEIR ABILITY TO PERCEIVE THAT VALUE. I WOULD POINT OUT THAT AS IN MANY AREAS RECENTLY, THE JAPANESE ARE QUICK TO SEE THAT RESEARCH AND DEVELOPMENT ARE ESSENTIAL, AND THEY ARE QUICK TO TAKE ADVANTAGE OF THE OPPORTUNITY TO JOIN WITH US IN THIS MATTER.

ON THE OTHER HAND, AMERICAN UTILITIES CONTINUE TO ACT AS IF THE ACCIDENT AT TMI DOES NOT CONCERN THEM AND THAT THERE IS NOTHING FOR THEM TO LEARN. THIS ATTITUDE, WHICH IS MANIFESTED IN MANY WAYS, CAN ONLY REDUCE CONGRESSIONAL SUPPORT IN OUR DOMESTIC NUCLEAR INDUSTRY, AND WILL LEAD INEVITABLY TO A CRISIS IN CONFIDENCE WHICH THE INDUSTRY, AND THE PUBLIC CAN ILL AFFORD AT THIS TIME.

I WOULD LIKE TO TAKE JUST A MOMENT TO POINT OUT THAT THIS SUBCOMMITTEE DOES NOT HAVE REGULATORY JURISDICTION OVER TMI. OUR JURISDICTION IS LIMITED TO THE RESEARCH AND DEVELOPMENTAL ASPECTS OF THE EFFORTS THERE. OUR ATTENTION THIS AFTERNOON WILL BE FOCUSED ON

HOW THE R&D EFFORTS ARE BEING CONDUCTED AND HOW WELL THE SCHEDULES ARE BEING HONORED. WE WILL ALSO BE DEEPLY INTERESTED IN THE VIEWS OF OUR WITNESSES CONCERNING THE MANY CHANGES AND IMPROVEMENTS IN MANAGEMENT, TRAINING AND OPERATIONS WHICH HAVE BEEN DEVELOPED AS A RESULT OF THE INTENSE ATTENTION GIVEN TO THESE AREAS AFTER THE ACCIDENT.

WE HAVE A SERIES OF WITNESSES THIS AFTERNOON WHO REPRESENT SOME OF THE MOST KNOWLEDGEABLE PEOPLE IN THE ARENA OF NUCLEAR OPERATION AND SAFETY. WE WILL BE HEARING FROM SHELBY BREWER, THE ASSISTANT SECRETARY FOR NUCLEAR ENERGY WHO BRINGS TO THE TABLE THE CONSIDERABLE TECHNOLOGICAL BASE OF THE UNITED STATES DEPARTMENT OF ENERGY.

WE WILL ALSO HEAR FROM HAROLD DENTON FROM THE NUCLEAR REGULATORY COMMISSION. MR. DENTON WON WIDE RESPECT FROM THE RESIDENTS SURROUNDING THREE MILE ISLAND DURING THE HECTIC DAYS FOLLOWING THE ACCIDENT FOR HIS PROFESSIONALISM, HIS DEDICATION, AND HIS TOTAL COMPETENCE. IT IS A PLEASURE TO WELCOME HIM HERE TODAY.

I AM ALSO PLEASED TO NOTE THAT WE HAVE THE CHAIRMAN OF THE NUCLEAR REGULATORY COMMISSION ADVISORY PANEL FOR THE DECONTAMINATION OF THREE MILE ISLAND, MAYOR ART MORRIS OF LANCASTER, PENNSYLVANIA. MAYOR MORRIS IS A CONSTITUENT, A FRIEND, AND A DEDICATED PUBLIC SERVANT. I WELCOME HIS PARTICIPATION THIS AFTERNOON.

FINALLY, I WANT TO WELCOME MR. WILLIAM KUHNS, THE CHAIRMAN AND CHIEF EXECUTIVE OFFICER OF THE GENERAL PUBLIC UTILITIES CORPORATION. MR. KUHNS HAS SEEN GPU THROUGH FIVE OF THE MOST

TURBULENT YEARS IMAGINABLE. WHILE ALL OF THE PROBLEMS FACING GPU HAVE NOT BEEN FULLY RESOLVED, THE PROGRESS MADE HAS BEEN REMARKABLE. I THINK THAT I HAVE ONLY TO POINT TO THE RECENT STUDY UNDERTAKEN BY ADMIRAL HYMAN G. RICKOVER OF THE OPERATION OF GENERAL PUBLIC UTILITIES TO INDICATE HOW MUCH PROGRESS HAS BEEN MADE. ANYONE WHO IS FAMILIAR WITH NUCLEAR ENERGY SHOULD BE WELL AWARE THAT ADMIRAL RICKOVER MAY WELL BE THE MOST DIFFICULT TASK-MASTER EVER TO CRITIQUE AN INDUSTRIAL OPERATION. HIS REPORT ON GPU IS A CLEAR INDICATION THAT THE COMPANY HAS BEEN WELL SERVED BY THE STEWARDSHIP OF MR. KUHNS. MADAM CHAIRMAN, I ASK UNANIMOUS CONSENT THAT BOTH THE ORIGINAL RICKOVER REPORT AND THE FOLLOW-UP REPORT AUTHORED BY ADMIRAL RICKOVER BE ENTERED INTO THE RECORD OF THE HEARING IMMEDIATELY FOLLOWING THESE REMARKS.

NOW, MADAM CHAIRMAN, I WANT THE RECORD TO REFLECT THAT I AM VERY THANKFUL TO THE CHAIRMAN FOR HER MANY COURTESIES IN CALLING THIS HEARING AND IN INVITING SUCH AN IMPRESSIVE COLLECTION OF WITNESSES. I THINK THAT THE RESULT WILL BE AN INTERESTING AND INFORMATIVE HEARING.

HOWEVER, I CANNOT HELP BUT OBSERVE THAT WE ARE MISSING A CRITICAL LINK IN THE AREA OF LESSONS LEARNED. I ASK UNANIMOUS CONSENT TO ENTER INTO THE RECORD AT THIS POINT COPIES OF LETTERS FROM THE CHAIRMAN OF THE SUBCOMMITTEE TO MR. CHARLES DAUGHERTY, CHAIRMAN OF THE EDISON ELECTRIC INSTITUTE, AND ADMIRAL E. P. WILKINSON, THE PRESIDENT EMERITUS OF THE INSTITUTE OF NUCLEAR POWER OPERATIONS, INVITING BOTH OF THOSE GENTLEMEN TO APPEAR AT THIS HEARING AND TO PROVIDE ESSENTIAL TESTIMONY. I AM INFORMED THAT LESS THAN A WEEK AGO, AND WITHIN THIRTY MINUTES OF EACH OTHER, WE WERE NOTIFIED THAT NEITHER EEI NOR INPO

WOULD PARTICIPATE.

MADAM CHAIRMAN, I CANNOT HELP BUT REACH THE CONCLUSION THAT FOR REASONS WHICH I DO NOT UNDERSTAND THE INDUSTRY HAS CHOSEN TO BOYCOTT THIS HEARING. WE HAD ALREADY RECIEVED ASSURANCES THAT THE SUBCOMMITTEE COULD EXPECT FULL COOPERATION FROM THESE ORGANIZATIONS BEFORE THE SUDDEN TURNABOUT OF LAST WEDNESDAY. IT APPEARS TO ME THAT THE INDUSTRY HAS DECIDED THAT THEY EITHER HAVE SOMETHING TO HIDE, OR THAT THEY ARE AFRAID THAT THEY WOULD BE EMBARRASSED HERE THIS AFTERNOON.

I HAD SPECIFICALLY REQUESTED THAT THE INSTITUTE OF NUCLEAR POWER OPERATIONS BE INCLUDED IN THIS HEARING BECAUSE I BELIEVE THAT THE NUCLEAR INDUSTRY HAS TAKEN MAJOR, AND FRANKLY VERY IMPRESSIVE STEPS THROUGH INPO TO CLEAN-UP MANY OF THE INSTITUTIONAL PROBLEMS WITHIN THE INDUSTRY AS A WHOLE. IN FACT, EVEN NRC COMMISSIONER GILINSKY, WHO HAS GAINED A CONSIDERABLE REPUTATION AS A CRITIC OF THE INDUSTRY HAS VERY COMPLIMENTARY THINGS TO SAY ABOUT THE MANY ACCOMPLISHMENTS OF ADMIRAL WILKINSON AND INPO. I THINK THAT OUR RECORD WILL BE INCOMPLETE WITHOUT HIS TESTIMONY AND WITHOUT HIS CONSIDERABLE KNOWLEDGE AND EXPERIENCE. I ALSO FEEL THAT INPO IS MISSING A VERY VALUABLE OPPORTUNITY TO BRING TO THE ATTENTION OF THE CONGRESS AND THE AMERICAN PEOPLE THE VERY IMPRESSIVE ACCOMPLISHMENTS THEY HAVE ACHIEVED IN ONLY A FEW SHORT YEARS. IN FACT, MADAM CHAIRMAN, AS DISAPPOINTED AS I AM THAT INPO WOULD ELECT TO BOYCOTT THIS HEARING, I AM STILL CONVINCED THAT THEY HAVE DONE WORK WHICH SHOULD BE BROUGHT TO THE ATTENTION OF THE CONGRESS AND THE AMERICAN PEOPLE. THEREFORE, I ASK UNANIMOUS

CONSENT THAT THE DOCUMENTS ENTITLED AN "INSTITUTIONAL PLAN FOR THE INSTITUTE OF NUCLEAR POWER OPERATIONS" AND THE 1983 ANNUAL REPORT OF INPO ENTITLED "ADVANCING EXCELLENCE" BE INCLUDED AS APPENDICES TO THIS HEARING RECORD.

I ALSO REGRET THAT THE EDISON ELECTRIC INSTITUTE HAS CHOSEN TO REJECT THE REQUEST OF THIS SUBCOMMITTEE THAT THEY BRING US THEIR CONSIDERABLE EXPERIENCE. THAT IS A REAL TRAGEDY. THE MAJOR LESSON OF THE EXPERIENCE AT THREE MILE ISLAND IS THAT IT COULD HAVE HAPPENED LITERALLY ANYWHERE. I AM AWARE THAT THERE HAVE BEEN MAJOR CHANGES WITHIN THE NUCLEAR INDUSTRY AS A RESULT OF THE WORK AT THE ISLAND, AND IT SEEMS TO ME THAT THE INDUSTRY NOT ONLY OWES THE PUBLIC A DUTY TO SHARE THAT KNOWLEDGE WITH THE PEOPLE, BUT THAT IT IS IRRESPONSIBLE AND INCREDIBLY SHORT-SIGHTED FOR THEM TO REFUSE TO DO SO.

I FIND THE CURRENT CONDUCT OF THE EDISON ELECTRIC INSTITUTE TO BE CONTEMPTUOUS OF THE CONGRESS, AND OF THE PEOPLE OF THIS NATION. ONE OF THE GREATEST PROBLEMS THE NUCLEAR INDUSTRY FACES TODAY IS A MASSIVE LOSS OF PUBLIC CONFIDENCE. THERE HAVE BEEN A SERIES OF PUBLIC OPINION POLLS WHICH HAVE INDICATED THAT THE AVERAGE CITIZEN OF THIS NATION HAS LOST CONFIDENCE IN THE COMPETENCY OF UTILITY MANAGEMENT, IN THE ABILITY OF THE NUCLEAR INDUSTRY TO OPERATE IN A MANNER WHICH WILL SAFEGUARD THE PUBLIC HEALTH AND SAFETY, AND PERHAPS MOST IMPORTANTLY, IN THE WILLINGNESS OF OFFICIALS IN THE NUCLEAR INDUSTRY TO BE TRUTHFUL AND OPEN WITH THE PUBLIC.

THIS COMMITTEE HAS SHOWN A CONSISTANT SUPPORT FOR MAINTAINING A

NUCLEAR OPTION IN THIS NATION. WE HAVE GONE TO GREAT LENGTHS TO PROVIDE A RESEARCH AND DEVELOPMENT PROGRAM THROUGH THE FEDERAL GOVERNMENT WHICH WILL PROVIDE A BASIS FOR THAT OPTION WELL INTO THE NEXT CENTURY. I FIND IT ABSOLUTELY INCREDIBLE THAT THE SPOKESMEN FOR THE INDUSTRY WE HAVE SO HELPED WOULD CLAIM THAT THEY HAVE NOTHING TO SAY TO THIS COMMITTEE.

MADAM CHAIRMAN, I WOULD POINT OUT THAT WE ASKED EACH POTENTIAL WITNESS TO ADDRESS THE SAME NINE SPECIFIC QUESTIONS, AND THE SUBCOMMITTEE STAFF INFORMED EACH POTENTIAL WITNESS TO ADDRESS THOSE QUESTIONS IN WHICH THEY HAD SPECIAL EXPERTISE OR INFORMATION. AMONG THOSE NINE QUESTIONS WERE THE FOLLOWING:

* WHAT ORGANIZATIONAL CHANGES HAVE ALREADY BEEN MANDATED AS A RESULT OF THE ACCIDENT, AND WHAT ADDITIONAL ONES ARE REQUIRED?

* HAVE CHANGES IN OPERATOR TRAINING ALREADY BEEN REQUIRED, AND WHAT ADDITIONAL CHANGES SHOULD BE MANDATED?

* HOW CAN SIMULATOR UTILIZATION BE ENHANCED SO AS TO IMPROVE OPERATOR TRAINING?

* WHAT PROGRESS HAS BEEN MADE TO DATE IN RECOVERY EFFORTS, AND IS THE CLEAN-UP AND RELATED R&D PROGRESSING ACCORDING TO SCHEDULE?

- WHAT IS THE VALUE OF THE INFORMATION BEING OBTAINED IN THE CLEAN-UP AND HOW IS IT BEING APPLIED IN THE NUCLEAR INDUSTRY TO ENHANCE SAFETY AND FOCUS R&D PROGRAMS?

- WHAT ARE THE IMPLICATIONS OF THE R&D PROGRAM FOR THE "SOURCE TERM" ISSUE; WILL ADDITIONAL RESEARCH DATA BE FORTHCOMING ON THIS CRITICAL ISSUE FROM THE TMI PROGRAM?

- WHAT HAS BEEN THE INVOLVEMENT OF THE GOVERNMENT IN THE RECOVERY EFFORT TO DATE, INCLUDING MANAGEMENT AND FUNDING OF THE R&D PROGRAM? DOES ANYTHING FURTHER NEED TO BE DONE AT THE FEDERAL LEVEL TO FACILITATE THE CLEAN-UP PROCESS INCLUDING ACCELERATION OF THE R&D PROGRAM?

- WHAT HAS BEEN THE INVOLVEMENT OF THE NUCLEAR INDUSTRY IN THE CLEAN-UP AND HOW MIGHT IT INCREASE ITS INVOLVEMENT?

- BASED ON YOUR KNOWLEDGE OF THE TMI STATUS AND CLEAN-UP ACTIVITY, WHAT RECOMMENDATIONS WOULD YOU OFFER THE SUBCOMMITTEE AT THIS TIME?

NOW, MADAM CHAIRMAN, THERE ARE AT LEAST SIX OF THOSE NINE QUESTIONS WHICH DIRECTLY APPLY TO THE NUCLEAR INDUSTRY AS A WHOLE. TO BE TOLD BY THE TWO INDUSTRY GROUPS THAT THEY HAVE NOTHING TO SAY ON THOSE ISSUES SHOWS A REMARKABLE CONTEMPT FOR THIS COMMITTEE.

THIS HEARING IS BEING HELD FOR A SERIOUS LEGISLATIVE PURPOSE. IN THE NEAR FUTURE THE CONGRESS MAY HAVE TO MAKE SEVERAL IMPORTANT CHOICES CONCERNING THE FUTURE OF NUCLEAR POWER IN THIS COUNTRY. THERE ARE MANY MEMBERS OF THIS CONGRESS WHO SHARE THE CONCERNS OF THE PRESENT ADMINISTRATION OVER THE FUTURE OF THE NUCLEAR OPTION IN AMERICA.

THE ONLY WAY THAT WE WILL BE ABLE TO MAKE REASONED DECISIONS ON THIS ISSUE WILL BE WITH A FULL AND OPEN DEBATE OF THE MERITS OF THE ISSUE, AND THOSE MERITS ONLY BECOME OBVIOUS WITH FULL DISCLOSURE. AT A TIME WHEN WE ASK THE INDUSTRY FOR CANDOR, WE GET CONTEMPT. AT A TIME WHEN WE REQUEST OPENNESS, WE GET OBSTRUCTIONISM. AT A TIME WHEN THE INDUSTRY IS IN IMMEDIATE NEED OF BUILDING PUBLIC CONFIDENCE THEY SEEM INTENT ON DESTROYING WHAT LITTLE CONGRESSIONAL SUPPORT THEY HAVE ALWAYS BEEN ABLE TO COUNT ON. THIS OSTRICH-LIKE ATTITUDE CAN ONLY DEEPEN THE PUBLIC CONCERN WHICH MAY LEAD TO THE ULTIMATE LOSS OF CONFIDENCE WHICH WILL FOREVER FORECLOSE THE OPTION OF NUCLEAR POWER IN THIS NATION.

MADAM CHAIRMAN, I REGRET THAT MY OPENING REMARKS MAY SOUND LIKE SOMETHING MORE FREQUENTLY HEARD ON SOME OTHER COMMITTEES OF THE CONGRESS, BUT I JUST CANNOT BELIEVE THAT THE INDUSTRY REPRESENTATIVES ARE BEING EITHER THIS INCREDIBLY SHORT-SIGHTED OR THIS EXTRAORDINARILY IRRESPONSIBLE. IT SEEMS OBVIOUS TO ME THAT UNLESS THERE IS A MAJOR EFFORT FROM BOTH THE CONGRESS AND THE ADMINISTRATION, IN COORDINATION WITH ALL SECTORS OF THE INDUSTRY AIMED AT RESTORING PUBLIC CONFIDENCE, THE NUCLEAR OPTION IS DEAD. AND I AM AFRAID THAT WHEN THE OBITUARY IS WRITTEN ON THE NUCLEAR INDUSTRY IT WILL SAY THAT THIS INDUSTRY EXPIRED FROM REPEATED SELF INFLICTED GUNSHOT WOUNDS TO THE FOOT.

MADAM CHAIRMAN, I ASK UNANIMOUS CONSENT TO INCLUDE IN THE RECORD AT THIS POINT COPIES OF LETTERS WHICH I AM SENDING TO THE EDISON ELECTRIC INSTITUTE AND TO THE INSTITUTE OF NUCLEAR POWER OPERATIONS INFORMING THEM OF MY VIEWS ON THEIR REFUSAL TO TESTIFY HERE TODAY.

DON FUQUA (Fla.) Chairman

ROBERT A. ROE, N.J.
GEORGE E. BROWN, JR., CALIF.
JAMES H. SCHEUER, N.Y.
RICHARD L. OTTINGER, N.Y.
TOM HARKIN, IOWA
MARILYN LLOYD, TENN.
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ROBERT G. TORRICELLI, N.J.
FREDERICK C. BOUCHER, VA.

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ROBERT C. KETCHAM
General Counsel
DAVID S. JEFFERY
Minority Staff Director

May 21, 1984

Admiral E. P. Wilkinson, USN (Ret.)
President Emeritus
Institute of Nuclear Power Operations
1449 Crest Road
Del Mar, California 92014

Dear Admiral Wilkinson:

I am writing to express my deep regret that you have chosen not to participate in the hearing of the Subcommittee on Energy Research and Production on May 22nd concerning lessions learned at Three Mile Island.

It was at my specific request that the Institute of Nuclear Power Operations was invited to give testimony at this hearing and I had indicated that I wanted you as a witness because I felt that you have been instrumental in leading the nuclear industry in a number of major, and very impressive steps in correcting institutional problems. It is my opinion that our hearing record will be incomplete without your participation.

Because I believe that INPO has made numerous valuable contributions to the nuclear industry and to the American people I intend to enter the "Institutional Plan for the Institute of Nuclear Power Operations" and your 1983 Annual Report into the record of our hearing. However, I do not believe that these documents will make up for your absence, and sincerely regret that you have elected not to share your considerable knowledge and experience with our Committee.

This Committee has the duty of making recommendations to the Congress concerning the future of nuclear power in this nation. At a time when the industry is under selge from many quarters, and is suffering from a number of serious self inflicted wounds, I think that you could have made a very positive contribution to our proceedings. I regret that you have elected not to do so.

Sincerely,

ROBERT S. WALKER
Ranking Republican Member
Subcommittee on Energy Research
and Production

cc: Mr. Z. T. Pate, President
Institute of Nuclear Power Operators
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

DON FUQUA (Fla.), Chairman

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DAVID S. JEFFERY
Minority Staff Director

May 21, 1984

Mr. Charles Dougherty
President and Chief Executive Officer
Union Electric Company
Post Office Box 149
St. Louis, Missouri 63166

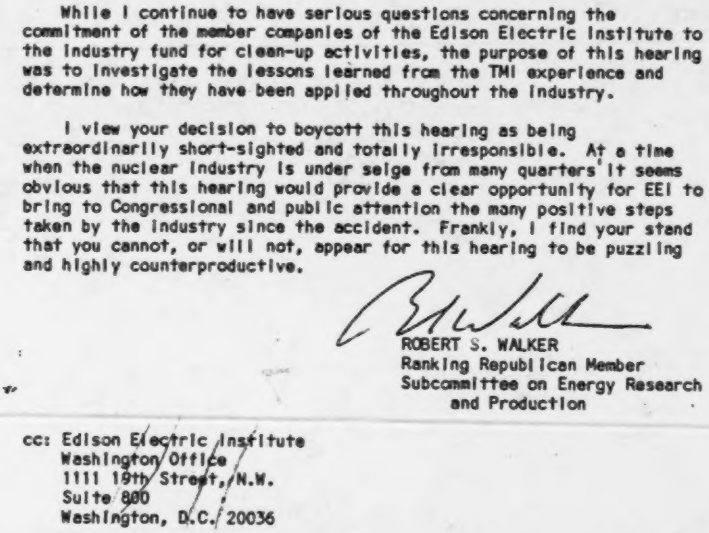
Dear Mr. Daugherty:

I am writing to you in your capacity as the Chairman of the Edison Electric Institute concerning your refusal to appear before the Subcommittee on Energy Research and Production of the United States House of Representatives.

When I learned that you had your staff notify the Subcommittee on May 16th that you refused to testify I must say that I was shocked. Your decision as the chief industry spokesman not to cooperate with the Subcommittee in the legitimate exercise of our Constitutional oversight responsibilities appears to be clearly contemptious of the Committee and of the Congress of the United States.

As you already know, this Committee has maintained a continuing interest in the activites taking place at Three Mile Island. We authorized the research and development activities funded by the federal government which are now being conducted there. In the immediate future there will be a number of important decisions which will have to be made by the Congress concerning the completion of the R&D efforts on the Island, and the implementation of the lessions learned as a result of the accident. This Subcommittee will have the responsibility of making recommendations to the Congress on these issues.

It is obvious that the Edison Electric Institute is a major spokesman, if not the major spokesman, for the nuclear industry in these matters, and it is also obvious that as the major repository of virtually all of the knowledge and expertise in the areas contained in our letter of May 11, 1984, your failure to participate will clearly hamper the efforts of the Subcommittee.



While I continue to have serious questions concerning the commitment of the member companies of the Edison Electric Institute to the industry fund for clean-up activities, the purpose of this hearing was to investigate the lessons learned from the TMI experience and determine how they have been applied throughout the industry.

I view your decision to boycott this hearing as being extraordinarily short-sighted and totally irresponsible. At a time when the nuclear industry is under seige from many quarters it seems obvious that this hearing would provide a clear opportunity for EEI to bring to Congressional and public attention the many positive steps taken by the industry since the accident. Frankly, I find your stand that you cannot, or will not, appear for this hearing to be puzzling and highly counterproductive.

ROBERT S. WALKER
Ranking Republican Member
Subcommittee on Energy Research
and Production

cc: Edison Electric Institute
Washington Office
1111 19th Street, N.W.
Suite 800
Washington, D.C. 20036

Mrs. Lloyd. It is my understanding that Congressman Winn also has remarks he would like to have inserted in the record. Without objection, they will also be made a part of the record.

[The prepared statement of Mr. Winn follows:]

STATEMENT BY THE HONORABLE LARRY WINN, JR.

TMI R&D PROGRAM STATUS

MAY 22, 1984

THANK YOU, MADAM CHAIRMAN, FOR THIS OPPORTUNITY TO MAKE A STATEMENT RELATIVE TO THE THREE MILE ISLAND PROJECT. I STRONGLY SUPPORT THIS HEARING AS WE EXAMINE THE LESSONS LEARNED IN UTILITY MANAGEMENT AND REVIEW THE STATUS OF THE FEDERALLY-SPONSORED RESEARCH AND DEVELOPMENT PROGRAM AT THE SITE.

I FEEL QUITE CERTAIN THAT THE WITNESSES APPEARING TODAY CAN GIVE US A GOOD REPORT ON THE TMI PROJECT AND I WELCOME THEM TO THIS FORUM. IT IS UNFORTUNATE THAT THERE ARE OTHER QUALIFIED ENTITIES WHO WERE INVITED AND CHOSE NOT TO APPEAR. HOWEVER, I WILL DEFER TO MY FRIEND AND COLLEAGUE, CONGRESSMAN WALKER, TO EXPLORE THOSE CIRCUMSTANCES.

THE TMI INCIDENT OF 5 YEARS AGO WAS AN EXTREMELY UNFORTUNATE OCCURRANCE. IT IS HOPED THAT ACTIVITIES BY ALL THE PARTICIPANTS IN THE 5 SUCCEEDING YEARS WILL ESTABLISH A NEW LEVEL OF STANDARDS WHICH WILL, IN TURN, IMPROVE THE PUBLIC'S PERCEPTION AND THE NUCLEAR INDUSTRY'S ACCEPTANCE. ENERGY IS TOO IMPORTANT TO THIS NATION'S PRESENT LIVING STANDARDS AND FUTURE GROWTH TO FOREGO THE NUCLEAR INDUSTRY AS AN ENERGY OPTION.

THANK YOU, MADAM CHAIRMAN, AGAIN FOR THIS TIMELY HEARING.

Mrs. Lloyd. Our first witness today is the Honorable Shelby Brewer, Assistant Secretary for Nuclear Energy.

We thank you for joining us today, Dr. Brewer, and we look forward to hearing from you. Let me say at the outset that all of the prepared statements will be included in the record in their entirety. In that event, you may summarize as you wish. Would you identify the gentleman with you?

Mr. Brewer. Thank you, Madam Chairman. I have with me Dr. Frank Coffman, who is responsible for TMI R&D activities, among other responsibilities.

Mrs. Lloyd. We welcome Dr. Coffman as well. Please proceed.

STATEMENT OF DR. SHELBY T. BREWER, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, U.S. DEPARTMENT OF ENERGY, ACCOMPANIED BY DR. FRANK COFFMAN

Dr. Brewer. We are pleased to be here, Madam Chairman, to share with you our insights on, first of all, TMI; its overall relevance to the future of the nuclear option; our view of the response, the constructive response by the institutions involved; and to report, finally, on achievements and status of DOE's efforts.

First, the relevance of the accident to the future of nuclear power: The bottom line is, Madam Chairman, that despite media-generated hysteria during and following the accident, the protective systems work, the technology worked, despite massive abuse of the system. Exposure of the public was insignificant. A maximum exposure of 77 millirems theoretically may have occurred and, by comparison, the difference between natural background radiation between Harrisburg and Denver, CO, is about 70 millirems. Now I am not suggesting that Denver be evacuated, but I think that placing the maximum theoretical exposure from the accident—due to the accident—in that kind of perspective is useful.

Although the public health and safety was not impaired by the accident, the accident has been a financial nightmare for the utility group that owned and operated the machine. That has been the central relevant issue the last several years: How shall the damage costs be allocated or burdened to the parties involved? Who pays?

We had not a major public health and safety calamity but, instead, a financial and institutional one. We have indeed experienced some groping by the institutions as to the appropriate financial response to the accident but, by and large, for a country that is as pluralistic in its deployment of nuclear power as ours, the response has not been bad and I believe that we are approaching a closed-end solution. I would characterize this situation as, the glass is half full; it is not half empty.

The leadership and skill in forging a real-world financial solution, and the persistence in bringing this solution about in an often hostile political environment is remarkable. Governor Thornburgh, former Secretary of Energy Edwards, and you, Mr. Walker, have struggled with the issues and put major elements of a solution in motion.

The generic response of industry—that is, the application of lessons learned—has also been remarkable. Soon after the accident occurred, Chairman of the Board Bill Lee of Duke Power was asked, Who is responsible and what will be done? Mr. Lee rose and said, "I am, we are, and we will." He then proceeded, with other nuclear industry utility leaders, to establish INPO.

What Mr. Lee and the others recognized, of course, was a need to standardize and coordinate reactor management and operations, and a sharing and a close coupling of experience and interpretation of reactor-operating data. This is, indeed, what INPO is providing. INPO is not a Federal bureaucracy; it is not a Federal entity. It was created by our Nation's nuclear utilities to solve their own problems, to monitor and police their own capabilities, and not to passively waft responsibility again to Germantown or to Bethesda. I will not enumerate INPO's functions and accomplishments over the past several years. You have witnesses, I believe, this afternoon who will do that.

Let me turn now, Madam Chairman, to DOE's efforts at TMI. Our efforts and responsibilities have been threefold: first of all, research and development of generic value which is mandated and authorized under the 1954 Atomic Energy Act. Second, we have waste management and waste disposition responsibilities, and the application of unique resources, capabilities, and expertise, and this is authorized not only by the 1954 Atomic Energy Act as amended, but the recently passed Nuclear Waste Policy Act of 1982.

Now the Department of Energy has not rushed in to take over, to bail out, to carve out more of a role than that required by statute; but, more to the point, DOE has stepped up to its responsibilities. It did not shirk or dodge them, and it stepped up promptly. I am personally proud of the Department's efforts at TMI. Throughout the recovery operation to date, the Department has been there to tackle and resolve unique, first-of-a-kind, ad hoc technical hurdles when they have occurred.

For example, the demineralizing system which has been used to clean up the wastewater was designed and developed by our DOE National Laboratory capability. Where the department had unique experience and capability, it has applied them promptly; and where the department has had special operational responsibilities under the law, the department has stepped up and accepted those responsibilities.

All the residual waste from the cleanup of the wastewater, of the spilled water, has been removed, was removed from the site and is out of the State as of last August. Moreover, I have recently signed a contract with the utility to accept responsibility for the damaged core under terms consistent with the Waste Policy Act of 1982. We are taking the entire core, not just a piece for research and development purposes; we are taking the entire core under the terms of the 1982 act. Moreover, we have sought and obtained funding from Japan in the amount of $18 million, Japanese utilities and industry.

Madam Chairman, this concludes my oral remarks. We have a short, 6-minute tape which, if it serves your pleasure, we could show at this time, that describes our research and development program.

[The prepared statement of Dr. Brewer follows:]

TESTIMONY OF

SHELBY T. BREWER
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
DEPARTMENT OF ENERGY

BEFORE THE
SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION
COMMITTEE ON SCIENCE AND TECHNOLOGY

MAY 22, 1984

Madam Chairman and members of the Subcommittee, I am pleased to have the opportunity today to provide an update on what is being done to implement the lessons offered by the Three Mile Island (TMI) experience. In my remarks, which will be within the context of the questions in your letter of invitation, I will focus on the Department of Energy's TMI research and development program. First, however, I will comment briefly on the initiatives that have been taken by the utilities and by the Nuclear Regulatory Commission (NRC) to improve the management of nuclear reactor operations.

In evaluating the progress that has been made, it is important to bear in mind that before the TMI accident, each utility operated its plants independently, largely isolated from interchanges of experience with other utilities. Consequently, although all plants were required to meet NRC regulations, the methods for doing so varied widely from plant to plant.

Following the accident at TMI, the utility industry recognized the need for cooperative effort to address existing problems and deficiencies. In response, the Institute of Nuclear Power Operations (INPO) was formed, with the mission of establishing "benchmarks of excellence" for the industry. As a result, procedures for the exchange of information and experience among the utilities have been instituted, and opportunities for training the operators of plants of similar design have been introduced. I understand that INPO is also developing a training course for plant supervisory management.

In addition, over the past 5 years, NRC has strengthened their requirements relating to reactor management and operator qualification and training. For example, the NRC now requires a technical assessment capability in the utility management structure which can provide for technical overview of reactor operations during both normal and accident conditions. Also, an additional "Senior Reactor Operator" has been added, and the responsibilities of the "Shift Supervisor" have been expanded. In addition, the licensing examination for reactor operators will include a demonstration of crew performance as well as individual performance.

Another area with substantial potential for increasing operator effectiveness is the use of simulators. The NRC has a major ongoing research program aimed at determining the best use of simulators to improve operator training. In recent years, the use of simulators of specific plant control rooms has increased dramatically. I am told that since 1979, the number of plant-specific simulators has tripled, from 10 to approximately 30, with 20 more to be added in the next several years. A $2.2 million simulator of nuclear plant operations is currently being used to train plant personnel at TMI. In addition, TMI reactor operators now undergo annual training at a full-scale Babcock & Wilcox simulator at Lynchburg, Virginia. Beginning in 1985, an on-site $8.8 million replica simulator will be used in a comprehensive training program for TMI reactor operations and support personnel.

The Department believes that the emphasis on the human element that the NRC and industry have placed to date in the area of organization and training is appropriate. While we will continue to evaluate this area, we have no recommendations for additional changes at this time.

I will now discuss the Department's research and development program at Three Mile Island. As you know, the objectives of this program are to develop generic technology to enhance recovery from a serious reactor accident and to improve the safety of nuclear powerplant design and operations through participation in the cleanup of the TMI plant. By bringing the Department's unique resources to bear on recovery operations and by developing new techniques to solve the problems encountered, substantial progress has been made. A valuable DOE contribution to the recovery process has been the series of entries into the damaged reactor core by means of television cameras. The information gained from these entries, which began on July 21, 1982, has been of major assistance in assessing the damage to the reactor and in planning the cleanup efforts.

To date, all of the radioactive liquid that was released into the reactor plant buildings during the accident has been processed at the TMI site, and the resulting radioactive byproducts have been transported to DOE laboratories for use in research and development. Preparations for the removal of the reactor head are essentially complete, and engineering and tool development for removal of the subsequent core internals are proceeding. GPU Nuclear (GPUN) has acquired the services of a contractor for engineering, tooling, and equipment development for the reactor defueling. DOE and GPUN have signed a contract for DOE's acquisition of the damaged core, for which GPUN has agreed to pay DOE $7 million. Preparations for transporting the core and for storing it at the Idaho National Engineering Laboratory (INEL) have been initiated. A comprehensive core examination plan has been developed that is expected to provide information of major significance to NRC and the nuclear power industry. Effective mechanisms have been established for technology transfer to the industry and regulatory agencies.

The information being obtained during the TMI cleanup is generally recognized as having major significance for the development of generic designs and procedures to avoid or mitigate the consequences of reactor accidents. Data from this program should assist in the development of future licensing criteria and improved plant operation and maintenance. The program already has contributed to improving reactor safety in the areas of personnel training and plant maintenance; decontamination procedures; and instrument design for reliable response under abnormal operating conditions. Further, new insights have been gained regarding releases of radionuclides in the core, the primary system, and the containment system.

A recent event has provided an example of the international interest in the research and development information from TMI. Last month, DOE signed an agreement with a group of Japanese utilities and industrial firms that provides for a contribution of $18 million to the TMI research and development program in return for access to the resulting information. We are gratified that the Japanese share our view of the importance of this data and the lessons to be learned.

Preliminary information related to source term issues has only recently been obtained from the TMI-2 reactor core. It is now clear, however, that this information will lead to improved knowledge of the magnitude of abnormal event consequences and of potential approaches to mitigating or reducing the consequences of severe accidents. Based on our early analysis, it appears that the data derived from examining the TMI-2 reactor core may be representative of the phenomena to be expected in a broad range of postulated severe accidents. Many important questions remain regarding the behavior of fission products during severe accidents involving light-water reactors (LWRs), which can have significant effects on the magnitude of the source term. Several of these issues that are planned to be addressed as part of the DOE TMI Program are: (1) the magnitude of tellurium release from the core; (2) the amount of cesium, iodine, and tellurium that will deposit within the reactor coolant system; and (3) the magnitude of nonradioactive aerosol formation and the effect of these aerosols on the attenuation and deposition of cesium, iodine, tellurium, and other important radionuclides.

The value of the technical assistance given to GPUN by the Department has been substantial. For example, DOE contractors developed a means of eliminating a hydrogen generation problem encountered during the storage and shipment of TMI wastes. We have provided valuable information related to the overall condition of the plant, including the observations made possible by the television camera entries into the reactor core. We have aided in the location and removal of radioactive materials in the containment system. We have provided technical assistance in the processing of radioactive water from the containment system. And we provided a prototype container that is enabling TMI waste material resulting from water processing to be disposed of commercially. In addition, the Department has provided an on-site laboratory for the analysis of radioactive samples, reducing the need to ship the samples off-site and thereby providing results in days rather than weeks.

Through FY 1983, approximately $71 million in DOE funding has been applied to TMI research and development. An additional $35 million is being applied during FY 1984. Our current budget estimate for the DOE TMI research and development program will allow us to maintain a presence at TMI through FY 1985 and to perform the examination of the damaged core thereafter. Under these circumstances, we will be able to participate in research and development activities associated with removal of the top loose segment of the core debris bed.

Turning now to the subject of overall funding of the cleanup, which includes the research and development efforts I have described, I am pleased that recent developments have resolved earlier projected funding shortfalls for 1984. GPUN has provided an increase of $10 million in its 1984 funding for the cleanup; and DOE has announced an increase of $8 million for its on-site effort, which includes $3 million from the Japanese participation, for research and development support of the cleanup. These increases bring the total funding available in 1984 to $93 million, which is approximately the amount that GPUN indicated was necessary in 1984 in order to maintain the cleanup schedule. This will allow removal of the reactor head this summer and solid progress toward initiation of defueling in 1985. Recent indications show a firm commitment on the part of GPUN toward meeting that schedule with the 1984 funding now available. Beyond 1984, however, a number of potential problems could seriously impact the cleanup process. These include:

- A delay by U.S. utilities in implementing their decision to contribute $150 million to the recovery effort.
- Failure of State regulatory bodies to allow revenues to be applied to the TMI-2 recovery.
- Any further delays in resolving issues related to the TMI-1 restart before the NRC.

Inability to resolve these issues could seriously hamper, and perhaps halt, meaningful progress on the TMI-2 recovery. From the standpoint of public health and safety, this is undesirable. Although the conditions at TMI-2 are now safe, increased risk will result if the reactor is left in its current abnormal state for a prolonged period. In addition, delays may substantially increase recovery cost.

In order to maintain the momentum of the program, all groups participating in the cleanup must recognize their obligations and responsibilities toward the TMI-2 problem. U.S. utilities have undertaken a voluntary effort to raise $150 million toward the TMI cleanup and research and development program through the Edison Electric Institute (EEI). To date, approximately $82 million has been pledged. This funding from the utilities is to begin when $100 million in pledges have been made. Renewed efforts to obtain utility funds for the cleanup are required. In addition, a more realistic approach by ratemaking authorities is needed to assure that a fair share of the cost of the recovery is borne by the users of the electricity generated by GPUN, in accordance with the plan suggested by Governor Thornburgh. The Department will continue its current role in the TMI recovery effort, but cooperation from all parties is needed to solve the problems I have described. We believe that a concerted, aggressive approach can overcome the problems we now face.

Madam Chairman, I will be pleased to answer any questions at this time.

Mrs. **Lloyd**. We would like to see the film, Dr. Brewer.

Dr. **Brewer**. Thank you.

[A videotape was shown.]

Mrs. **Lloyd**. Thank you very much, Dr. Brewer. That was certainly well done.

One of the objects of being here today, as we stated earlier, was to see what we have learned. When you analyzed the condition of the core, the reactor core, and the plant after the accident, we are anxious to know what you really learned about the accident. How close did the core come to melting down?

Dr. **Brewer**. Madam Chairman, I don't believe it's correct technically to characterize this as a meltdown accident. You saw from the film that the condition of the residue is sort of like gravel. I believe our specialists believe that the disruption mechanism was embrittlement of the cladding, which snapped, and the core slumped, and there was not a classic meltdown scenario.

Mrs. **Lloyd**. Well, if we had had a meltdown, what would the consequences have been?

Dr. **Brewer**. Well, the physical consequences would have been, in my view, about the same, the financial consequences, about the same.

Mrs. **Lloyd**. Has anything happened, anything new in the picture, since the analysis that was performed by the Kemeny Commission?

Dr. **Brewer**. Many of the Kemeny Commission recommendations have, in fact, been placed in force. There are several Kemeny recommendations, for example, that INPO has acted on, and I would be pleased to provide for the record a more detailed treatment of that.

[The material follows:]

The establishment of INPO was, in fact, a direct response on the part of the utility industry to the TMI event and the Kemeny recommendations. A major part of INPO activity is the systematic gathering, review, and analysis of operating experience at all nuclear power plants coupled with an industry-wide international communications network to facilitate the speedy flow of this information to affected parties. These functions are in response to Kemeny Commission recommendations.

INPO has established the "Nuclear Network," which gathers and distributes significant event information to all nuclear utilities in the U.S. and 14 foreign countries. In addition, INPO reviews and analyzes these events and makes recommendations to participating utilities for the purpose of improving reactor operations, maintenance, and reliability. Moreover, INPO performs annual reviews at each utility to ensure recommendations are incorporated into the utilities' operating procedures. In response to Kemeny recommendations, INPO has taken responsibility for training and accreditation of reactor operators. It also assists the utility industry in radiation evaluations (release measurements, tracking, etc.), and in emergency preparedness.

Mrs. **Lloyd**. Without objection, I would like for you to supply it for the record.

Turning to the status of the utility contributions to the cleanup we are rather concerned about, how much has been paid so far by the utilities?

Dr. **Brewer**. It is my understanding, Madam Chairman, that the target is $150 million. About $82 or $83 million has been pledged so far, and there is a trigger point at $100 million.

Mrs. **Lloyd**. That's when they actually use the money.

Dr. **Brewer**. They will make the money available when the pledges reach $100 million.

Mrs. **Lloyd**. When do you think they will reach $100 million?

Dr. **Brewer**. It's hard to say. The EEI is working very hard on the matter. I have written a letter to EEI urging expedition and possibly considering lowering the trigger point, but——

Mrs. **Lloyd**. Well, has it helped that the IRS has ruled in their favor, for treating their contributions as business expenses?

Dr. **Brewer**. Certainly that would help with the State public utility commissions. As for a quantitative answer to that question, Madam Chairman, I can't answer it. When the valve was turned on with the IRS ruling, I don't know if additional money started flowing.

Mrs. **Lloyd**. Have the States helped, the public utility commissions, have they helped in this area toward making the contributions more advantageous?

Dr. **Brewer**. The natural tendency, institutional behavior of a State utility commission, would be to disallow a contribution, the classical argument being: The accident did not occur here. It occurred in Pennsylvania. Why should my ratepayers pay? There is a natural barrier.

Mrs. **Lloyd**. Well, what part has been able to be included in the utility rate base?

Dr. **Brewer**. I'm sorry?

Mrs. **Lloyd**. What part of this expenditure has been allowed to be included in the public utility rate base, to be included in the rate base?

Dr. **Brewer**. It's based on the quantity of nuclear electricity generated into that PUC region.

Mrs. **Lloyd**. Well, I think I can assure you that Mr. Walker and I will continue to have an interest in events at TMI, and we will continue with our oversight hearings, as much as they pertain to the jurisdiction of this committee.

You said that you will accept the entire core. What kind of information do you expect to get from the damaged core?

Dr. **Brewer**. We hope to discern, Madam Chairman, some very basic data on the mechanics of the accident. The information will directly be useful, I believe, in determining the source term, reevaluating the source term phenomena, core degradation, and will permit us to do or recommend core design improvements. The Nuclear Regulatory Commission, as you know, is considering a rulemaking on core degradation, and while their schedule is more accelerated than ours, this core examination should be useful in confirming their findings.

Mrs. **Lloyd**. What are you eventually going to do with the core?

Dr. **Brewer**. Ultimately, Madam Chairman, it will be disposed of in the same fashion—disposed of under the provisions of the Waste Management Act, either an MRS or an ultimate geological repository.

Mrs. **Lloyd**. It won't have to be reprocessed before disposing of it, will it?

Dr. **Brewer**. Probably not, although there are residual uranium and enrichment values in the core. The core was practically new when the accident occurred, so the fuel value is still there if it were to be—if it could be reprocessed.

Mrs. LLOYD. Well, it would have a more unique makeup than——

Dr. BREWER. Well, it would have to be reprocessed and the uranium and plutonium quantities removed and the fuel refabricated into fuel pins.

Mrs. LLOYD. Thank you very much.

Mr. Walker.

Mr. WALKER. Thank you, Madam Chairman.

With regard to the funding, I think you provided an interesting perspective with regard to not only your determination about whether or not legislative action is possible or probable but also whether or not it is needed. If I understand correctly, if in fact we would follow through on the commitment that has been made in the R&D area; if the States would continue through with the commitment they have made; if we got the amount of money from the utility, namely GPU Nuclear, that it has pledged along the way and then if the EEI were to follow through with the kind of commitment that they originally talked about, we would in fact have enough money to get the job done, wouldn't we?

Dr. BREWER. Mr. Walker, almost. The Thornberg formula has not quite been met in detail. The State tax contribution of $45 million is in place. The residual insurance of $90 million is in place. When TMI-1 starts up, that will provide—one-third of that revenue stream, as I understand, will generate about $245 million. The nuclear utility figure under the Thornberg formula was $190 million, and that has not yet come to pass, as we know.

Mr. WALKER. Well, that's the point that I was about to make, is that the one link in the chain that causes some problems at the present time is the fact that the industry has not followed through on its pledge of money, and even if they get to the $100 million threshold, we are still some distance away at that point from the amounts of money that were really needed from the industry in order to make the plan work.

Dr. BREWER. Yes, sir, but the other link in the chain or kink in the chain is the TMI-1 startup. If that were to be delayed or disallowed, then that revenue stream would not be present.

Mr. WALKER. Well, let me also follow on on that. Would it make sense to you, do you think, to tie the TMI-1 startup, if in fact that can be shown to be a safe and a reasonable thing to do—and that, of course, is NRC's decision—but would it make sense to tie that restart to money going directly into unit No. 1? In other words, the money made from unit No. 1 would flow directly into the cleanup of unit No. 2 to assure that funding stream.

Mr. COFFMAN. My understanding is that the current rate allowances would provide an adequate and a fair flowthrough to provide the $245 million for the Thornburgh plan, if TMI-1 restarts. I would not recommend that you tie the TMI-1 restart to, for example, the EEI participation. This program has been one that has worked, basically because on a unilateral basis each of the participants—sometimes not in a timely manner—but from time to time each participant has come to the table and we have been able to sustain some progress. I think if all of these had been tied together, there would probably be nobody at the table.

Mr. **Walker**. That's right, and self-interest plays a role and so on, and that's certainly a consideration, but my point was not necessarily to tie to EEI but simply tie together the restart of unit No. 1 and the revenues generated by it to the cleanup process in unit No. 2, in other words, tie those two together so that the public was assured that the restart of unit No. 1 and the revenues generated by that would in fact be of direct benefit to the cleanup process.

Dr. **Brewer**. Mr. Walker, it is my understanding that is the plan and that the revenue stream to the cleanup is based on the savings, the savings had by not having to import power.

Mr. **Walker**. Well, in other words, that linkup seems reasonable to you?

Dr. **Brewer**. Yes, sir.

Mr. **Walker**. You state that the core from TMI will undergo careful examination at the Idaho National Engineering Laboratory. Who is going to fund that examination?

Dr. **Brewer**. We will fund all of the research and development funding for the examination. We will charge the utility and have, in fact, signed a contract for the transportation and storage of the core, just like we would any other fuel under the Waste Management Act of 1982.

Mr. **Walker**. How much is that going to cost?

Dr. **Brewer**. About $20 million for the examination.

Mr. **Walker**. $20 million? I also share your view that the State regulatory bodies must be convinced that it is in their own interest to allow some revenues to be applied to TMI, to recovery.

Let me ask you this: How much has Congress, and particularly this committee, committed to the cleanup effort at West Valley in New York?

Dr. **Brewer**. The total estimated cost to complete the West Valley project is about $500 million, and it's about $50 million in fiscal year 1985.

Mr. **Walker**. How much of that effort is being paid for by the Federal taxpayer, and how much of it is coming from the State of New York?

Dr. **Brewer**. It's a 90-10 split, in other words, 90 percent Federal taxpayer, 10 percent State, and the State contribution is some cash and some in-kind facility displacements; 10 percent State, 90 percent Federal taxpayer.

Mr. **Walker**. Are you aware that the Public Service Commission in the State of New York has ruled that the New York utilities, which requested permission to contribute less than $1 million a year over the next 6 years, cannot make those contributions because they are "not in the public interest"?

Dr. **Brewer**. Yes, sir. I learned that this morning.

Mr. **Walker**. Madam Chairman, I ask unanimous consent that the full text of the order be entered into the record at this point.

[Material follows:]

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service
Commission held in the City of
Albany on April 11, 1984

COMMISSIONERS PRESENT:
Paul L. Gioia, Chairman
Carmel Carrington Marr
Harold A. Jerry, Jr.
Anne F. Mead
Rosemary S. Pooler

CASE 28730 - Petition of Consolidated Edison, Long Island Lighting Company, New York State Electric and Gas, Niagara Mohawk Power Corporation and Rochester Gas and Electric Corporation for Permission to Contribute Revenues Toward the Cleanup of the Three Mile Island Generating Unit No. 2 and Request Approval of the Accounting and Ratemaking Treatment for Such Expenditures.

ORDER DENYING PETITION

BY THE COMMISSION:

By petition filed January 31, 1984, Consolidated Edison Company of New York, Long Island Lighting Company, New York State Electric & Gas Company, Niagara Mohawk Power Corporation and Rochester Gas & Electric Corporation requested permission to use utility revenues for the purpose of contributing to the cleanup of the damaged Three Mile Island Unit 2 Generating Station (TMI). LILCO subsequently withdrew from the petition by letter dated

March 23, 1984, "[i]n view of its serious and continuing financial problems." The proposed contributions would be pursuant to a plan of the Edison Electric Institute under which the nation's investor-owned electric utilities would contribute $150 million to the TMI cleanup. Petitioners seek to contribute the following amounts annually over a six-year period: Con Edison, $331,510, NYSE&G, $112,619, NMPC, $374,572 and RG&E, $130,017, and request that their contributions be treated as research and development expenditures for rate purposes. The Consumer Protection Board has filed a request that the petition be rejected as insufficient and that hearings be held upon any resubmitted petition.

Petitioners argue that the TMI cleanup expenditures are not the use of revenues for a non-utility purpose, which requires our approval pursuant to Section 107 of the Public Service Law. However, we have previously informed the petitioners that the use of utility revenues for the TMI cleanup requires Section 107 approval (Notice issued February 16, 1982 in Case 28171). Thus, the petition is untimely insofar as it requests us to reconsider our position on the Section 107 issue.

Petitioners also argue that the contributions should be treated as research and development expenditures since a successful TMI cleanup will lead to benefits for New York's ratepayers, including an alleged reduction in the cost of utility capital, and increased knowledge of nuclear plant operations and decommissioning practices. However, the likelihood of any such reduction in the cost of capital arising has not been demonstrated, for it is not readily apparent that investor concern with nuclear utilities arises out of the TMI situation, rather than out of the large construction cost overruns and project cancellations connected with nuclear projects. Further, while it is conceivable that technical knowledge beneficial to nuclear plant operations and practices will be generated by a TMI cleanup, a realistic assessment of whether the cleanup will provide such knowledge, and whether such knowledge will be relevant to nuclear plant operations in New York, has not been adequately set forth in the petition. Moreover, there has been no showing that petitioners' participation in the TMI cleanup is necessary to obtain the benefits of any TMI related reseach and development activities.

Finally, we cannot overlook the fact that New York ratepayers on the average pay among the highest utility rates in the country, and New York utilities have their own nuclear plant financing problems. Thus, it is difficult to justify using New York ratepayer funds to provide financial assistance to an out-of-state utility (with rates lower than those of some of the petitioners) in order for that utility to solve a major financial problem.

Accordingly, based on all of the foregoing, we will deny the petition, for the petitioners have not demonstrated that the relief they seek is in the public interest; and it is hereby

ORDERED:

1. That the petition of Consolidated Edison Company of New York, Inc., New York State Electric and Gas Corporation, Niagara Mohawk Power Corporation and Rochester Gas and Electric Corporation for permission to use revenues received from the rendition of public service in order to contribute to the cleanup of the Three Mile Island Generating Unit No. 2 is hereby denied; and

2. That this proceeding is closed.

By the Commission,

(SIGNED)

JOHN J. KELLIHER
Secretary

Mr. **Walker**. I would ask Dr. Brewer exactly how much will the Department of Energy expend at West Valley this year. Well, you said that it would be about $50 million in fiscal year 1985.

Dr. **Brewer**. Yes, sir.

Mr. **Walker**. And in each of the next 5 years?

Dr. **Brewer**. Well, it peaks up to around $60 or $70 million. The total cost from minus infinity to completion will be about a half a billion dollars.

Mr. **Walker**. Obviously, I make that point because the problem that we face in this committee is not a problem which is exclusive to TMI. We are running into this problem with the shared arrangements with public utility commissions in other places, and it seems to me that we have got to address as a part of this overall formula, the responsibility of the utilities and the responsibilities of the commissions that regulate those utilities to participate in funding processes which in fact do have a national interest as well as a local interest. That is disturbing with regard to Three Mile Island; it is disturbing with regard to West Valley. It seems to me it's a trend which is very, very problematic for the entire industry over the next several years.

Dr. Brewer, could we get for the record your letter to EEI that you referred to?

Dr. **Brewer**. Yes, sir. I have it with me and I will provide it to staff.

[The material follows:]

Department of Energy
Washington, D.C. 20585

April 17, 1984

Mr. Charles J. Dougherty
Chairman of the Board
Edison Electric Institute
1111 Nineteenth Street, N.W.
Washington, D.C. 20036

Dear Mr. Dougherty:

The Department of Energy (DOE) has a cooperative research and development (R&D) program with GPU Nuclear Corporation related to the Three Mile Island Unit 2 (TMI-2) reactor. It is part of the overall TMI cleanup program, which, as indicated below, has significant R&D benefits to the electric utility industry. The R&D program is aimed at achieving a thorough understanding of the accident at TMI; thereby, contributing to the further enhancement of the safety of pressurized water reactors and, indeed, light water reactors in general. The rationale for the DOE program is based upon evidence obtained from TMI to date that R&D activities will provide information related to the operation, maintenance, and general safety of light water reactors during severe accidents. This information will increase industry's knowledge and the public's confidence in the safety of light water reactors.

I would also add that, in addition to conducting R&D of generic benefit under the authorization provided by the Atomic Energy Act (1954) and subsequent legislation, we have also stepped up promptly, in this case, to our operational responsibility to provide a means for disposing of wastes. We have agreed to accept title of the damaged fuel, not merely a portion of it for R&D purposes, under provisions consistent with the Waste Policy Act of 1982.

The cleanup at TMI is unprecedented in breadth and scope. It is the first decontamination of a large, commercial nuclear powerplant. Direct research values will be gained through the examination of the damaged fuel core, the evaluation of material which performed in a hostile environment, the evaluation of reactor components, instrumentation and the ability to "autopsy" the accident. Techniques for managing large-scale decommissioning operations, which all nuclear utilities must eventually carry out, will be advanced. Additionally, the cleanup effort itself, including procedure and tool development, has major research and development value which will be of benefit to the worldwide nuclear industry. In this regard, I have recently obtained direct funding of $18 million from Japan to augment DOE's efforts.

We believe U.S. industry's participation will provide the opportunity to derive significant and direct R&D benefits for utilities and their customers. The $150 million target embarked upon by the utility industry represents a significant step forward in achieving these R&D benefits, and we urge your continuing efforts in this regard.

The DOE believes the cost benefit of R&D activities at TMI to be enormous. As you may be aware, the Energy Research and Advisory Board recently recommended to the Secretary of Energy that DOE TMI program efforts should receive greater emphasis and, if possible, be expedited due to the value of information to be derived from TMI R&D that will ultimately improve industry and Government's knowledge of the safety of light water reactors.

I wish you success in the speedy completion of the Edison Electric Institute's TMI-2 pledge program so that this valuable R&D program can move forward expeditiously. If you have any questions, please contact me.

Sincerely,

/s/

Shelby T. Brewer
Assistant Secretary
for Nuclear Energy

Mr. WALKER. I would also ask, Madam Chairman, that all witnesses respond to additional written questions that might be asked.

Mrs. LLOYD. They will certainly be asked to respond to written questions.

We do have several votes at the present time, so the committee will stand in recess while we make the votes, and we do apologize for this delay.

[A short recess was taken.]

Mrs. LLOYD. The subcommittee will come to order.

It is my understanding Mr. Torricelli would like to ask Dr. Brewer a question and submit two or three other questions for Mr. Kuhns for the record.

Dr. WALKER. Madam Chairman, is it possible to get unanimous consent for Mr. Gekas in whose district TMI rests, to sit with the committee for a few minutes while he is here.

Mrs. LLOYD. I have no objection.

Mr. WALKER. I would ask for unanimous consent.

Mrs. LLOYD. Mr. Torricelli, I think, has a question for Dr. Brewer. The Chair recognizes Mr. Torricelli.

Mr. TORRICELLI. Thank you for recognizing me, Madam Chairman. Thank you very much for your patience in giving me this opportunity.

I wanted only briefly, if I could, to ask irrespective of my own State, being New Jersey, what is DOE doing at this point to encourage other utilities to participate in the cleanup so that the base will be broader here?

Dr. BREWER. Congressman, we have urged EEI, who—well, urged EEI to get on with the collection of pledges for the TMI cleanup. They have a target of $150 million, of which they have pledges of about $83 million, as I understand, and they have a trigger point at $100 million before they release any funding. The Department has written to EEI and urged expedition in collecting those pledges.

Mr. **Torricelli**. Do you have a number that you use that is a good estimate of the cost of what it would be in my State if we had to develop a new capacity to replace Three Mile Island for the State of New Jersey in electric power?

Dr. **Brewer**. I can provide that for the record.

Mr. **Torricelli**. I would appreciate it if you would make that available.

Dr. **Brewer**. Yes, sir.

[The material follows:]

To replace Three Mile Island would require installing new capacity at a cost of $1.0–1.3 billion (1983 dollars). This assumes constructing a 625 MWe plant that is put in service in 1993. New Jersey used 220 MWe annually from TMI. Therefore, the cost to New Jersey would be $350–455 million (1983 dollars).

Mr. **Torricelli**. Is there a similar number that you use on the economic impact on New Jersey, on a loss, not having this power back on stream, a waiting period before new generating capacity is developed.

Dr. **Brewer**. Yes, sir.

Mr. **Torricelli**. Is there an economic analysis available?

Mr. **Brewer**. We can provide that for the record. I can't analyze it here on the spot but I see the intent of your question.

[The material follows:]

Currently, the New Jersey ratepayers are paying about $20 million per year over and above what they would be paying for TMI generated power. Over the 9- to 10-year period required to install new capacity, the net cost to New Jersey ratepayers would be on the order of $200–$300 million.

Mr. **Torricelli**. I would appreciate both of those. I think it is generally unrecognized in New Jersey, as we debate this in environmental terms, that it has to be considered in economic terms as well. I don't think those numbers are understood by the public or the political leadership, the enormous costs of replacing the power, the economic dislocation in the interim, and the extent to which the burden can be shared.

Let me also thank, if I could, the gentle chairlady of the committee who has been enormously helpful to my State in this very difficult period. I want to state publicly my appreciation.

Mrs. **Lloyd**. The Chair would like to thank the gentleman, and also thank him for participating this afternoon. I understand that you also had some questions you would like to have submitted for the record for Mr. Kuhns.

Mr. **Torricelli**. I would. Thank you.

Mrs. **Lloyd**. We certainly will comply with your request.

Dr. Brewer, we certainly thank you and Dr. Coffman for being with us today. We appreciate both of you being here.

Dr. **Brewer**. It's a pleasure, Madam Chairman.

Mrs. **Lloyd**. I think it has been agreed that we will now hear from Mayor Arthur Morris from Lancaster, PA, who is chairman of the NRC Advisory Panel for the Decontamination of Three Mile Island. Dr. Denton has agreed to let Mayor Morris come first because I believe he has a plane to catch.

We welcome you today and we have your testimony, so you may proceed as you wish.

STATEMENT OF ARTHUR E. MORRIS, MAYOR OF LANCASTER, PA, AND CHAIRMAN, NUCLEAR REGULATORY COMMISSION ADVISORY PANEL FOR THE DECONTAMINATION OF THREE MILE ISLAND UNIT 2

Mr. MORRIS. Thank you, Chairman Lloyd and other members of the subcommittee. I do appreciate the opportunity to present testimony regarding Three Mile Island. I would like to stop at this point and thank Dr. Denton for allowing me to jump in ahead of him, as well.

My testimony is offered from two perspectives: as chairman of the NRC advisory panel for the decontamination of TMI unit 2, and as mayor of Lancaster. While I only assumed the position of chairman late last year, I have served on the committee since its formation in late 1980. I took office as mayor of Lancaster in January 1980. I was the civil defense director in Lancaster when the accident at TMI occurred in 1979.

As you know, the letter of invitation from Chairman Lloyd included questions covering many different areas. My testimony will respond to three of these questions.

What progress has been made to date in recovery efforts, and is the cleanup and related R&D progressing according to schedule? There is no question but that some progress has been made. Contaminated water in the auxiliary building has been treated. The SDS and Epicore systems used in treating the water have worked extremely well. The liners which contain the radioactive waste removed from the contaminated water have almost all been shipped from the island. The crane has been tested and is ready for the head lift which is scheduled for late summer/early fall this year. The cleanup work that has been done seems to have been carried out well.

However, work is not progressing according to any real schedule. In 1979, following the accident, the cleanup was estimated to take up to 5 years. An updated schedule completed in late 1981 called for cleanup completion by the end of 1986. The latest updates in 1984 don't anticipate cleanup completion until 1989 or later. We never seem to get closer than 5 years from the completion date. What this means is that any findings anticipated through the R&D process are being delayed and, above all, the public living in the area of TMI must continue to live with the stress associated with this accident and cleanup for a much longer period of time.

Next question: What has been the involvement of the Government in the recovery effort to date, including management and funding of the R&D program? Does anything further need to be done at the Federal level to facilitate the cleanup process, including acceleration of the R&D program?

I believe that the NRC, EPA, and DOE have put forward good, solid efforts at the plant by their site personnel throughout the cleanup. However, not enough has been done in Washington, either by the NRC or the Federal Government, to get the work completed in an expeditious fashion, and when I say "Federal Government" I am referring here to the administration and to Congress in general, not specifically referring to this subcommittee, which I believe has done an awful lot of work.

Funds are inadequate and, consequently, work is dragging. In 1981 GPU projected the following funding levels: for 1982, over $134 million; 1983, over $196 million; 1984, in excess of $151 million. An update of these years will show the following actual or anticipated expenditures: 1982, $64 million; 1983, $76 million; 1984, $77 million. This is unacceptable to me. I hope you agree.

By the end of 1984, almost all insurance money will have been expended by GPU. Without substantial moneys from other sources, the cleanup will slow down tremendously. In fact, I can foresee that cleanup would not progress to a point sufficient for research and development moneys from the Department of Energy to be used. Such a possibility was highlighted by DOE at one of our panel meetings last September. The following account by Mr. Dave McGoff of DOE is taken directly from the transcript of the September 28, 1983, meeting.

If I could, I would basically skip over that by just saying that his comments indicated that at that point, that if $15 to $20 million additional moneys were not found, that DOE moneys probably would not be able to be used in fiscal year 1984. While the loss of funding by DOE was averted in 1984, a distinct possibility of such a dilemma exists for 1985 which would bring cleanup only one step short of standstill.

Even with this possibility facing us, the Federal Government is not putting sufficient effort into a solution. In addition, the nuclear industry has not responded to the appeal for moneys since the Edison Electric Institute's goal of $100 million for cleanup has not been reached, even after a favorable IRS decision was made. No longer can the Federal Government wait and hope that the problem is solved by others or that the problem will just go away. Recent estimates show a $200 million funding shortfall for the cleanup. More R&D moneys will certainly help. However, without funds from elsewhere, work will not progress to the point that R&D funds can be used or at least used effectively.

A Federal funding plan is needed. Whether this should be in the form of a Federal loan program or a fund created by a special assessment of nuclear powerplants or some other plan, I do not know. I do know that the current circumstances call for special measures. We need a display of sensitivity and creativity to solve our dilemma. A commitment by the Federal Government to find a solution would go a long way.

The last question I would respond to is: Based on your knowledge of the TMI status and cleanup activity, what recommendations would you offer the subcommittee at this time?

While there is certainly much to be learned through the R&D work commissioned by the Federal Government for TMI unit 2, our learning process through this work is being greatly delayed. Emphasis must shift to development of a funding plan that will get the job completed in a definite period of time.

I commend this subcommittee for bringing before you today most, if not all, of the major parties that have vested interests in the cleanup. Obviously, I made these remarks and had them prepared before I realized that EEI was not going to accept your kind invitation. I would recommend that you take this further and rally these parties—basically EEI, GPU, NRC, DOE, the U.S. Congress, and the administration—so that this funding problem can be resolved. People in central Pennsylvania specifically, and those across the Nation who live each day next to a nuclear powerplant, need to know that accidents occurring at these facilities can and will be cleaned up expeditiously. A plan should be developed which would work, not only in the case of TMI but at any other location as well.

In the meantime I would ask your subcommittee to join in supporting the action taken by our advisory panel at our meeting of December 8, 1983. At that meeting we voted to request the NRC to not consider the restart of TMI unit 1 until sufficient funding is committed to clean up the damaged unit 2 reactor. The panel felt then and continues to feel that positive, progressive action by the NRC and others is needed to bring greater focus on the funding shortfall. We feel that a refusal by the NRC to consider TMI unit 1 restart until cleanup funding is in place will send a clear message, and obviously one needs to be sent, to those that have been sitting on the sidelines instead of helping to resolve this critical problem. Our panel does not feel that it makes good sense to consider starting up a plant when its sister plant on the same site does not have funding in place for the cleanup after an accident. I would urge this subcommittee to adopt a similar position and to notify the NRC accordingly.

I would like to conclude by thanking you for providing me with the opportunity to give testimony today, and also say that it is a pleasure to give testimony before a subcommittee that involves my own Congressman, Congressman Walker.

[The prepared statement of Mr. Morris follows:]

TMI HEARING

SUBCOMMITTEE OF ENERGY RESEARCH & PRODUCTION

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

(Testimony of Arthur E. Morris, Mayor of Lancaster, PA)

Chairman Lloyd and other members of the Subcommittee, thank you for giving me the opportunity to present testimony regarding Three Mile Island. My testimony is offered from two perspectives - as Chairman of the NRC Advisory Panel for the Decontamination of TMI - Unit 2 and as Mayor of Lancaster. While I only assumed the position of Chairman late last year, I have served on the committee since its formation in 1980. I took office as Mayor of Lancaster in January of 1980. I was the Civil Defense Director in Lancaster when the accident at TMI occurred in 1979.

As you know, the letter of invitation from Chairman Lloyd included questions covering many different areas. My testimony will respond to three of these questions.

- What progress has been made to date in recovery efforts, and is the cleanup and related R&D progressing according to schedule ?

There is no question but that some progress has been made. Contaminated water in the auxiliary building has been treated. The SDS and Epicore systems used in treating the water have worked extremely well. The liners which contain the radioactive waste removed from the contaminated water have almost all been shipped from the island. The crane has been tested and is ready for the head lift which is scheduled for late summer/early fall this year.

The cleanup work that has been done seems to have been carried out well.

However, work is not progressing according to any real schedule. In 1979, following the accident, the cleanup was estimated to take up to 5 years. An updated schedule completed in late 1981 called for clean-up completion by the end of 1986. The latest updates in 1984 don't anticipate clean-up completion until 1989 or later. We never seem to get closer than 5 years from the completion date. What this means is that any findings anticipated through the R&D process are also being delayed and above all the public living in the area of TMI must continue to live with the stress associated with this accident and cleanup for a much longer period of time.

- What has been the involvement of the government in the recovery effort to date, including management and funding of the R&D program? Does anything further need to be done at the Federal level to facilitate the clean-up process including acceleration of the R&D program?

I believe that the NRC, EPA and DOE have put forward good solid efforts at the plant (by their site personnel) throughout the cleanup. However, not enough has been done in Washington either by the NRC or the Federal government to get the work completed in an expedious fashion.

Funds are inadequate and consequently work is dragging. In 1981 GPU projected the following funding levels:

1982 - $134,873,000

1983 - $196,804,000

1984 - $151,819,000

An update of these years will show the following actual or anticipated expenditures:

1982 - $64,000,000

1983 - $76,000,000

1984 - $77,000,000

This is unacceptable to me. I hope you agree. By the end of 1984 almost all insurance money will have been expended by GPU. Without substantial monies from other sources, the cleanup will slow down tremendously. In fact, I can foresee that cleanup would not progress to a point sufficient for Research and Development monies from the Department of Energy (DOE) to be used. Such a possibility was highlighted by DOE at one of our panel meetings last September. The following account by Mr. Dave McGoff of DOE is taken directly from the transcript of the September 28, 1983 meeting:

> As part of our planning for 1984, our fiscal year starts on October 1st of this year. GPU briefed us concerning their outlooks and budget for the 1984 period. Their preliminary assessment was that they would have funding on the order of $80

million during the 1984 period, as opposed to the $100 million originally contemplated for that time.

We discussed this with them. It appeared that that program, while marginal, was still worthwhile. We agreed to work with GPU to try to secure additional funding for such sources as the industry and some foreign sources.

There was one item of concern, however, in that discussion. GPU advised us that of the $80 million planned for fiscal '84, for calendar '84, something on the order of $15 to $20 million was not yet firm, but dependent upon a favorable vote by the Pennsylvania Public Utilities Commission.

In our view, failure to obtain that $15 to $20 million and therefore get up to what we consider an $80 million program would give us great problems. GPU has advised us that should we be far below an $80 million level, probably such activities as reactor disassembly and defueling would not move considerably during 1984. Since our funding is tied to progress in that area, it can very well be that DOE's activity would have to be curtailed in 1984 as well.

> In other words, there's a multiplier effect here. Should GPU not be able to raise the $60 million funding in fiscal '84 they may not then be able to do the critical R&D tasks on reactor defueling. We're constrained by the guidelines of the Administration to put our dollars on those tasks so we might have to defer our dollars until 1985.

While the loss of funding by DOE was averted in 1984, a distinct possibility of such a dilemna exists for 1985 which would bring cleanup only one step ahead of standstill.

Even with this possibility facing us the Federal Government is not putting sufficient effort into a solution. In addition, the nuclear industry has not responded to the appeal for monies since the Edison Electric Institute's goal of $100 million for cleanup has not been reached even after a favorable IRS decision was made.

No longer can the Federal Government wait and hope that the problem is solved by others or that the problem will just go away. Recent estimates show a $200 million funding shortfall for the cleanup. More R&D monies will certainly help. However, without funds from elsewhere, work will not progress to the point that R&D funds can be used.

A federal funding plan is needed. Whether this should be in the form of a federal loan program, a fund created by a special assessment of nuclear power plants or some other plan, I do not know. I do know that the current circumstances call for special measures. We need a display of sensitivity and creativity to solve our dilemna. A commitment by the Federal Government to find a solution would go a long way.

- Based on your knowledge of the TMI status and clean-up activity, what recommendations would you offer the Subcommittee at this time?

While there is certainly much to be learned through the R&D work commissioned by the Federal Government for TMI Unit 2, our learning process through this work is being greatly delayed. Emphasis must shift to the development of a funding plan that will get the job completed in a definite period of time.

I commend this Subcommittee for bringing before you today most, if not all, of the major parties that have vested interests in the cleanup. I would recommend that you take this further and rally these parties - EEI, GPU, NRC, DOE, the U.S. Congress and the Administration - so that this funding problem can be resolved. People in Central Pennsylvania specifically, and those across the nation who live each day next to a nuclear power plant, need to know that accidents occurring at these facilities can and will be cleaned up expeditiously. A plan should be developed which would work, not only in the case of TMI, bût at other locations as well.

In the meantime I would ask your Subcommittee to join in supporting the action taken by our Advisory Panel at our meeting of December 8, 1983. At that meeting we voted to request the NRC to not consider the restart of TMI Unit 1 until sufficient funding is committed to clean up the damaged unit 2 reactor. The panel felt then and continues to feel that positive, aggressive action by the NRC and others is needed to bring greater focus on the funding shortfall. We feel that a refusal by the NRC to consider TMI Unit 1 restart until clean-up funding is in place will send a clear message to those that have been sitting on the sidelines instead of helping to resolve this critical problem. Our panel does not feel that it makes good sense to consider starting up a plant when its sister plant on the same site does not have funding in place for the cleanup after an accident.

I would urge this Subcommittee to adopt a similar position and to notify the NRC accordingly.

Thank you for the opportunity to present this testimony today.

Mrs. **Lloyd**. Well, we thank you very much, and thank you for being here, Mayor Morris.

Who do you think was hurt most by the TMI accident? Do you think it was the population, the stockholders, the ratepayers, or the entire nuclear industry?

Mr. **Morris**. You just about included all of it. All of them obviously have been hurt significantly. The population, damage to the population may not have been so much from the amount of radioactivity, because I don't know that there were any real measured health effects, but perceived health effects and the concerns and the pressures felt by the public were significant and they continue to be significant. Every day that plant remains uncleaned is another day that goes by with concern, and truly it exists. It may not exist with somebody like me, but it does with the local residents in central Pennsylvania.

Mrs. **Lloyd**. Well, it does sort of look like a treadmill, that we're not moving rapidly.

Mr. Walker.

Mr. **Walker**. Thank you, Madam Chairman.

Let me just reemphasize the point that you have just made, and thank you first of all for your testimony. I think that the industry was very slow to awaken to the fact that much of the damage that was done in terms of the populace of our area was psychological damage; that people who had been taught to trust the technology that was being built at their doorstep all of a sudden came to realize that it might not be as trustworthy as they originally perceived, and they have had too many instances since of an industry that hasn't responded to that kind of psychological issue that was raised.

The disappointment when EEI has not followed through on their commitment and has not allowed us to put a full funding plan into place, is the fact that that perception of the industry continues. Despite the efforts of GPU, despite efforts by this subcommittee, despite efforts otherwise, you have a continuing pattern of people having the feeling that the industry just doesn't care about their problems, and that is a real problem, I think, that we have yet to address in a meaningful way.

I would assume that you find at least somewhat encouraging the fact that DOE and GPU have now found some additional funding that should help put the cleanup, at least for the immediate future, back on track.

Mr. **Morris**. I think anything helps. I think you mentioned it was $18 million, and truly that's fairly significant. It probably represents anywhere from 15 to 20 percent of the moneys that are needed in any one year. Next year seems to be a very critical year. Every time you talk about funding, everybody, including GPU and the NRC, seems to feel that they really don't know exactly what is going to be available next year. Time is critical. That money will help but I think we need more help than that.

Mr. **Walker**. You and the panel had suggested that the restart of unit No. 1 be held open until the funding plan was in place, and I must admit that I have some sympathy to that. My one concern about that is, do you think, though, that EEI that has acted so irresponsibly and is kind of the people that are in the hot seat on this one and would be in the hot seat under your proposal, should be given virtual veto power over the cleanup progressing? If you do that, in a sense you give EEI the ability to say, "Well, that's it. We go no further."

Mr. Morris. I think you're right in that regard unless the Federal Government would decide to take upon itself to do something about it. Now I realize that has been tried already and it has failed. To wait for EEI to do something, with all the complications with local PUC's, it just doesn't seem that that's going to be the answer. It keeps dragging on. First it was the IRS was the problem. Then when that was resolved, we still don't have the money that was promised and I don't have a lot of hope for that. If we sit around waiting for that money to be available, I don't think we're going to get TMI unit 2 cleaned up, so I think if they are going to provide money they are going to have to be forced to provide it by the Federal Government.

Mr. Walker. Now if we get past that hurdle, would you agree with me that any potential restart of unit No. 1 should be conditioned on commitment to use any necessary revenues from unit 1 for the cleanup of unit 2?

Mr. Morris. Yes. I think there should be a requirement of that, and I don't have a problem of coming up with this $200 million shortfall if some of the money from TMI–1 restart goes toward that shortfall. I think that's what should take place. However, the restart will not solve the whole $200 million problem.

Mr. Walker. Understandably, and also, since NRC has ruled that they cannot as a matter of law condition the restart of unit No. 1 on a financial commitment with regard to unit No. 2, would you think that a commitment by the company itself to carry forth in that way would be acceptable?

Mr. Morris. No. Again, I am talking as a layperson here, but I feel that while the NRC says there is nothing under the law that they can do, I feel that if they really went to find a way to condition it, they can do it. I just feel they——

Mr. Walker. If not formally, at least informally, then.

Mr. Morris. Yes, if that's the only way, then informally. I'm just not convinced that they can't do it formally in some way, shape, or form if they really want to do it, and they seem to be reluctant to get into tying them together. I just feel that they need to be urged to take a closer look at it.

Mr. Walker. Thank you, Madam Chairman.

Mrs. Lloyd. Thank you very much, Mayor Morris, for appearing before our committee today.

Mr. Morris. Thank you.

Mrs. Lloyd. We also thank Dr. Denton for letting us rearrange the schedule. Now we look forward to hearing from Dr. Denton, Dr. Harold Denton of the Nuclear Regulatory Commission.

Good afternoon. Dr. Denton, would you identify the gentlemen that are appearing with you for the benefit of our recorder?

Dr. Denton. Yes, Madam Chairman. On my left is Dr. Bernard J. Snyder, who is the Director of the TMI program office. On my right is Lake Barrett, who is the Deputy Director of that program office; and further to the right is Hugh Thompson, Director of the Division of Human Factors.

Mrs. **Lloyd**. Thank you very much for being with us today, gentlemen.

STATEMENT OF DR. HAROLD R. DENTON, DIRECTOR, OFFICE OF NUCLEAR REACTOR REGULATION, U.S. NUCLEAR REGULATORY COMMISSION, ACCOMPANIED BY DR. BERNARD J. SNYDER, DIRECTOR, TMI PROGRAM OFFICE; LAKE BARRETT, DEPUTY DIRECTOR, TMI PROGRAM OFFICE; AND HUGH THOMPSON, DIRECTOR, OFFICE OF HUMAN FACTORS

Dr. **Denton**. Madam Chairman, in response to your invitation of May 11, I appreciate the opportunity to be here today to present the NRC staff testimony on TMI-2. What I will propose to do is to give an abbreviated summary of my testimony in view of the time.

Mrs. **Lloyd**. We do apologize for the delay. We hope it hasn't inconvenienced you.

Mr. **Denton**. My testimony addresses each of the questions posed in your May 11 letter. Before that, however, I want to give you a brief summary of the TMI-2 plant status from a regulatory perspective.

Significant progress has been made to immobilize and ship offsite the radioactivity dispersed within the plant during the accident. These shipments represent more than 90 percent of the radioactive inventory, exclusive of damaged fuel. Decontamination of plant surfaces and equipment is progressing. However, many of the more contaminated areas of the plant have been bypassed and the most difficult task—defueling—has not yet begun. In addition, cleanup of the reactor building has proven to be much more difficult because of recontamination problems and high radiation levels from fixed sources of radiation, caused in part by delays in cleanup which permitted the radioactivity to penetrate paint and concrete surfaces.

GPU's official schedule for the initiation of plenum removal and fuel debris removal are mid-1985 and early 1986, respectively. We are aware that GPU is reviewing their plans to determine if an accelerated defueling schedule can be accomplished. However, there is considerable uncertainty in these schedules, given the formidable financial and technical problems that the licensee must overcome, and we have serious reservations about GPU meeting their current schedules.

There is adequate committed funding for the cleanup activities planned for this calendar year, 1984. However, based on NRC staff analyses, there exists a significant shortfall of roughly $200 million in firmly committed funding for calendar year 1985 and beyond. This shortfall represents nearly 45 percent of the remaining cleanup costs and, if it is not alleviated, it will significantly impact the pace of the cleanup and result in delays in the aforementioned schedules. Obviously, as the schedules for cleanup activities are delayed, the corresponding schedules for related R&D activities are also delayed. In addition, significant schedule delays could result in higher cost for eventual cleanup.

The NRC is concerned about the more than 5 years that TMI-2 has been in a condition for which it was not designed. Clearly we would have never issued a license for a facility that was in this condition, but we have no real alternative in the present situation. We have compensated for this situation by making a significant commitment of NRC resources to the regulatory oversight of the facility. Although the facility is well-monitored and is presently safe, no one can be certain what the long delays in cleanup portend for the future.

Basically, our concern is that, in contrast to a normal nuclear facility, we and GPU cannot ascertain what safety margins exist at TMI-2. Further extended delays increase the risk to the occupational work force and offsite public due to the increased possibility of some unforeseen occurrence. Our concern is also that this site in the middle of a river near major population centers could become, by default, the first high-level waste storage facility in the United States. The NRC's basic goal at TMI-2 is to ensure that this never happens.

However, the agency's role is limited. For example, we have no legal basis to provide any cleanup funds, and that is appropriate for a regulatory agency. We are also limited in our ability to expedite the cleanup, since we are dealing with a licensee with such limited financial constraints. Approximately 70 percent of the cleanup funding to date has been from GPU's insurance, but that source is nearly now exhausted. Inasmuch as funding uncertainties have a major impact on the pace of cleanup activities, my recommendation to this subcommittee is to seek ways to provide adequate funds to complete this cleanup in a timely manner.

There have been numerous suggestions made in this area. For example, legislation could provide tax credits to electric utility customers for the portion of their monthly bills that are going to the TMI-2 cleanup. Ultimately, Government-backed loans similar to the type of assistance provided to the Chrysler Corp. might be considered.

Another possibility which would only be a partial solution is legislation which provides Federal funds which match those appropriated to the cleanup by State governments. Pennsylvania and New Jersey are providing such contributions and have included them in their 1984 budgets.

In testimony recently presented to other congressional committees, NRC Chairman Palladino has suggested that consideration be given to an approach similar to that used for the West Valley site. Chairman Palladino was not proposing a Federal bailout but, rather, he suggested having the Federal Government provide cleanup funds with GPU providing reimbursement when the cleanup is complete and GPU's financial stability improves.

In my view, in addition to the potential safety problems the cleanup has become a national source of embarrassment and must certainly erode the confidence of others that we are a Nation capable of expeditiously solving complex technological problems. An approximate analogy can be drawn from the TMI-2 accident and the crash of a commercial aircraft. In both cases, the industry, Government, and the public have a vital interest in the causes and consequences of the accident. Unfortunately, in the case of TMI-2 there appears to be no funding mechanism to ensure that information from the damaged fuel and equipment will be expeditiously factored into the operation and design of other nuclear plants.

The current situation at TMI-2 is analogous to not immediately undertaking a detailed, comprehensive examination of a crashed airplane. NRC and the industry need to know the information that can only be achieved by prompt cleanup and the removal of the damaged TMI-2 core to DOE laboratories for much-needed study.

Because of the present uncertainty of GPU having adequate funds to carry out the planned cleanup activities for 1985 and beyond, we remain pessimistic about a timely completion of the cleanup, uninterrupted by funding constraints.

This completes my summary, Madam Chairman, and I would be pleased to respond to questions.

[The prepared statement of Dr. Denton follows:]

PREPARED TESTIMONY

SUBMITTED BY

UNITED STATES NUCLEAR REGULATORY COMMISSION

PRESENTED BY

HAROLD R. DENTON, DIRECTOR

OFFICE OF NUCLEAR REACTOR REGULATION

BEFORE THE

SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION

COMMITTEE ON SCIENCE AND TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

CONCERNING

LESSONS LEARNED IN UTILITY MANAGEMENT

AND

THE STATUS OF THE R&D PROGRAM

FOLLOWING

THE ACCIDENT AT THREE MILE ISLAND

SUBMITTED MAY 22, 1984

Madam Chairman and members of the subcommittee, in response to your invitation of May 11 to Chairman Palladino, I appreciate the opportunity to be here today to present the Nuclear Regulatory Commission staff testimony on TMI-2. Dr. Bernard J. Snyder and Mr. Lake H. Barrett, Director and Deputy Director, respectively, for our Three Mile Island Program Office are also here with me today.

My testimony will address each of the questions posed in your May 11 letter. Before that, however, I wanted to give you a brief summary of the TMI-2 plant status from the regulatory perspective. A more detailed status is provided for the record as an attachment to this testimony. Significant progress has been made to immobilize and ship offsite the radioactivity dispersed within the plant during the accident. These shipments represent more than 90% of the radioactive inventory, exclusive of the damaged fuel. Decontamination of plant surfaces and equipment is progressing, however, many of the most contaminated areas of the plant have been bypassed and the most difficult task, defueling, has not yet begun. In addition, cleanup of the reactor building has proven to be much more difficult because of recontamination problems and high radiation levels from fixed sources of radiation, caused in part by delays in cleanup which permitted the radioactivity to penetrate paint and concrete surfaces. The NRC staff is just completing a supplement to our three year old Environmental Impact Statement to assess the increased total radiation exposures to workers we now anticipate will result to complete the cleanup.

The major milestones yet to be completed include reactor vessel head lift, plenum removal, fuel assembly and debris removal, fuel packaging and offsite shipment, facility decontamination, disposal of radioactive wastes, and ultimate disposition of the processed accident water. The original schedule (mid-1983) for reactor vessel head lift has been delayed by a year, primarily as a result of administrative and procedural deficiencies in cleanup activities. Head lift is now scheduled for August of this year.

GPU schedules for the initiation of plenum removal and fuel debris removal are mid-1985 and early 1986, respectively. However, there is considerable uncertainty in these schedules given the formidable financial and technical problems that the licensee must overcome, and we have serious reservations about GPU meeting their current schedule for initiating fuel removal in early 1986. There is adequate committed funding for the cleanup activities planned for this calendar year (1984); however, based on NRC staff analysis, there exists a significant shortfall (roughly $200 million) in firmly committed funding for calendar year 1985 and beyond. This shortfall represents nearly 45% of the remaining cleanup costs and if it is not alleviated, it will significantly impact the pace of the cleanup and result in delays in the aforementioned schedules. Obviously, as the schedules for cleanup activities are delayed, the corresponding schedules for related R&D activities are also delayed. In addition, significant schedule delays could result in a higher cost for eventual cleanup.

I now wish to address the questions you raised.

With regard to organizational changes that have already been mandated as a result of the accident, the Nuclear Regulatory Commission Task Action Plan, NUREG-0660, developed after the accident at TMI-2, describes, among other items, organizational changes to be considered in order to improve the safety of nuclear power plants.

NRC has required that all operating nuclear power plants add a Shift Technical Advisor (STA) to their operating shift crews to provide engineering expertise to the Shift Supervisor. The STAs have a bachelor's degree or the equivalent in a scientific or engineering discipline and have received specific training in the response and analysis of the plant for transients and accidents.

Each utility has evaluated the administrative nonsafety duties workload of their shift supervisors and made reassignments of administrative duties such that the operating shift supervisor's time is better focused on the safe operation of the unit and that a clear delineation of the command decision authority of the supervisor in the control room relative to other plant management personnel has been established. Administrative policies have been issued requiring utilities to provide controls over the amount of overtime work performed by operating shift crews and key maintenance personnel.

Since the accident at TMI-2, each utility has been required to establish a program to provide for the feedback of operating experience from their own nuclear power plants(s) and from experience throughout the industry. Each operating nuclear power plant that has been licensed to operate since TMI-2 has been required to have two licensed senior operators on each shift when the plant is operating. One of these two licensed senior operators is required to remain in the control room at all times. In July 1983, NRC amended its regulations (10 CFR 50.54) regarding staffing at nuclear power plants to require operating plants meet the increased requirements by January 1, 1984.

As regards to the area of operator training, significant changes have already been required, and additional changes are underway. After the accident at Three Mile Island, NRC increased operator training and examination requirements. These include (1) training and examination in heat transfer, fluid flow and thermodynamics; and mitigating core damage, and (2) specific control manipulations for requalification programs. In addition, the score for passing the NRC written examination for power reactors was increased from 70 overall to 80 overall and at least 70 in each of the major sections of the exam.

In response to Section 306 of the Nuclear Waste Policy Act of 1982, P. L. 97-425, the staff has developed an integrated approach to training, qualifications, and examinations and has prepared a proposed rulemaking package and appropriate regulatory guidance for publication for public comment. The proposed training and qualifications rule requires that: (1) each nuclear power plant licensee and applicant for an operating license establish and implement training programs that are derived from a systems approach to training; and (2) the licensee or applicant ensure that personnel have qualifications commensurate with the performance requirements of the job.

The essential elements of the systems approach which the licensee or applicant must employ are: 1) systematic analysis of the performance requirements for the job; 2) development of learning objectives from the analysis; 3) design and implementation of training programs to achieve the specified learning objectives; 4) trainee evaluation according to job performance standards, and 5) systematic, regularly scheduled evaluation of the effectiveness of the training program. The proposed rulemaking, which is presently under review by the Commission, introduces all the requirements for training which we currently believe are appropriate.

In addition, it should be noted that the proposed rule supports the industry initiative to improve training that is already underway. This initiative is the training accreditation program operated by INPO, a process which formally recognizes utilities that develop and implement training programs based on a systems approach to training. NRC implementation requirements for the proposed rule are minimal for utilities seeking or having obtained INPO Accreditation. For utilities not seeking INPO Accreditation, the NRC implementation requirements will be followed.

Simulator utilization is being enhanced so as to improve operator training. Simulator based training has become general practice in the nuclear industry. Most utilities have installed or have on order simulators specifically referenced to their plants.

As part of NRC's response to the Nuclear Waste Policy Act of 1982, P. L. 97-425, the NRC staff is developing proposed rulemaking which includes a more comprehensive requirement for operating tests as part of the reactor operator licensing process. In connection with the proposed rulemaking, which will be published for public comment this year, the following provisions are under consideration:

(1) A change to the regulations governing "operating tests" (10 CFR 55.45) to include a requirement for the license candidate to demonstrate an "ability to perform" on a simulation facility* which has been determined to provide the ability to evaluate performance. The utility would apply to the NRC for approval to use a simulation facility for the conduct of operating tests, and, after evaluation, the NRC would approve the use of it as appropriate for the conduct of such tests.

(2) A change to the Regulatory Guide endorsing ANSI/ANS 3.5, which describes a method acceptable to the NRC staff for complying with those portions of the Commission's regulations with regard to the approval of a simulation facility.

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*A simulation facility has been defined in the proposed regulations as: "one or more of the following components, alone or in combination, used for the partial conduct of operating tests...: (i) the plant, (ii) a plant-referenced simulator, (iii) another simulation device."

Thus, simulator utilization will be enhanced, not only to improve the validity and reliability of operating tests but also, due to the use of a systematic approach to training, to operator training as well.

- Each utility will be required to have access to a simulation facility.

- Required annual reports will ensure that the simulation facility maintains its appropriateness for the conduct of operating tests.

- New requirements for operating tests will likely result in simulator use for training to meet these objectives, which include:

  (a) Team-dependent behaviors

  (b) Time-critical behaviors

  (c) The demonstrated "ability to perform" twelve other classes of activities important to safe operation.

- In general, simulator-based training is expected to increase due to the new requirements for simulation facility-based examination.

- The increased availability of simulators should also serve to reduce training-related travel time and costs for the utilities, and improve the morale and motivation of trainees, thus further enhancing the training benefits.

I now will turn to the questions specific to the cleanup of TMI-2.

Delays in the cleanup are resulting in delays in the collection, evaluation, and utilization of important safety information that could otherwise be of benefit to this agency and the nuclear industry. While considerable information has already been obtained in the cleanup to date, much more data remains to be obtained as the focus of the cleanup is directed towards reactor disassembly and defueling. TMI-2 should be one of the best sources for the study of accident initiation, propagation, impact and recovery. The information that could be obtained is extremely valuable. To date the limited information derived from the accident and subsequent cleanup has increased understanding of fission product behavior resulting from severe accidents, the metal-water reaction and the corresponding generation of hydrogen, the management of very highly contaminated liquid and solid radioactive waste, the management of gaseous radioactive waste, decontamination methodology and techniques, radiological and physical protection of workers in highly contaminated areas, and radiation and environmental effects on materials and equipment. If the information remaining to be obtained is forthcoming in a timely manner, it could be applied to current and planned nuclear power facilities in a variety of areas including plant and equipment layout and design, accident mitigation system design, instrument location and design, radioactive waste processing system design, paint selection and application for contamination control, electrical equipment material selection for environmental and radiation resistance, and development of fission product behavior from severe accidents. The limited information obtained so far from the accident and cleanup has helped somewhat to direct and focus our research needs. When more complete information is available from TMI-2, it may have additional impact on our research programs.

With regard to the current research program related to the "source term" issue, extensive efforts are underway to better estimate the source terms associated with severe accidents, occasioned, in part, from the observation of fission product behavior during the TMI accident. These include research associated with the release of fission products from the fuel, fission product depletion mechanisms, accident phenomenology, and containment response. While it appears that there may be significant reduction in the magnitude of certain types of fission products released for certain accident sequences when compared to earlier estimates of such releases, the current estimates vary substantially for different types of plants and different accident scenarios, so that we are not yet in a position to estimate confidently the overall impact of the research results.

The primary impact of information from the TMI-2 accident has been in the direction and focusing of source term research on the phenomena observed at TMI. Detailed data on specific aspects of fission product physics and chemistry for the source terms reevaluation program, which is nearing completion, is obtained from controlled laboratory experiments, and does not depend on future extraction of this information from TMI. Any additional information acquired in the longer term, together with longer term analytical and experimental laboratory results, will be supplemental to the near-term data, and will serve to verify the current estimates.

Now I would like to discuss the role of the Federal Government in the cleanup efforts to date, including the management and funding of the principal R&D activities related to TMI-2. Three Federal agencies have played a role in the cleanup efforts to date, the Environmental Protection Agency (EPA), the Department of Energy (DOE) and, of course, the NRC. The EPA has the lead Federal responsibility for monitoring the offsite environs of Three Mile Island and operates numerous monitoring stations in the local area. The EPA results are made public on a regular basis. The DOE has managed and funded all of the direct cleanup-related R&D activities at TMI although the NRC has contributed to research planning and implementation with our representation on research advisory groups and our oversight role at the site. In accordance with the Memorandum of Understanding between the NRC and DOE, the DOE has played a key role in acquiring the high-specific activity solid wastes resulting from TMI-2 cleanup activities for research, storage or disposal. The DOE will also acquire the entire core. Of course, the primary role of the NRC at TMI is the oversight of the cleanup to protect the health and safety of the public and we have an office staff of 21 full time, permanent individuals at the TMI site and NRC Headquarters dedicated to that effort.

Given the present status of the cleanup and the fact that the pace is largely controlled by available funding, I am pessimistic about the prospects for a timely conclusion. The anticipated cleanup funding was based on the plan proposed by Pennsylvania Governor Thornburgh which assumed committed funding would be provided from a number of sources, including the utility industry, the Federal Government, GPU, and the governments of Pennsylvania and New Jersey. However, the anticipated level of funding from the industry (roughly 30 million dollars per year for six years) has not been forthcoming. The only segment of the U.S. nuclear industry that is giving consideration to contributing significantly to the cleanup is the group of private electric utilities working through the Edison Electric Institute (EEI). Pledges of contributions have been made, but the level of pledges has yet to reach the minimum amount (100 million dollars) that is needed before the utility members of the Edison Electric Institute will be asked to provide any funds. The current level of pledges is $79 million. We are unaware of any other segments of the nuclear industry (i.e., public utilities, reactor suppliers, architect-engineers, or equipment vendors) that are considering contributing to the cleanup. This is in sharp contrast to the recent commitments from all segments of the Japanese nuclear industry to provide $18 million to the cleanup in exchange for technical information. The only industry involvement in the cleanup program to date, through the Electric Power Research Institute funded research activities at about $1 million per year, is insignificant when compared to the total estimated cost of approximately one billion dollars for the cleanup.

The level of committed funds (94 million dollars from all other sources) for calendar year 1984 is adequate for the cleanup activities planned for this year. However, for calendar years 1985 and beyond, there currently exists a shortfall of roughly $200 million of the funds needed to complete the cleanup. The shortfall, if not alleviated, obviously portends delays in the cleanup, a probable extension of the end of cleanup to 1990 or beyond, and a concomitant increase in the overall cleanup costs.

NRC is concerned about the more than five years that TMI-2 has been in a condition for which it was not designed. Clearly we would never issue a license for a facility that was in this condition, but we have no real alternative in this situation. We have compensated for this situation by making a significant commitment of NRC resources to the regulatory oversight of the facility. Although the facility is well-monitored and is presently safe, no one can be certain what the long delays in cleanup portend for the future. Basically our concern is that, in contrast to a normal nuclear facility, we and GPU cannot ascertain what safety margins exist at TMI-2.

Further extended delays increase the risks to the occupational workforce and offsite public due to the increased possibility of some unforeseen occurrence. Our concern is also that this site, in the middle of a river near major population centers, could become, by default, the first high-level waste storage facility. The NRC's basic goal at TMI-2 is to ensure that this never happens. However, our agency's role is limited. For example, we have no legal basis to provide any cleanup funds, and that is appropriate for a regulatory agency. We are also limited in our ability to expedite the cleanup since we are dealing with a licensee with such significant financial constraints.

Approximately 70% of cleanup funding to date has been from GPU's insurance but that source is now nearly exhausted. Inasmuch as funding uncertainties have the major impact on the pace of cleanup activities, my recommendation to this subcommittee is to seek ways to provide adequate funds to complete this cleanup in a timely manner. There have been numerous suggestions made in this area. For example, legislation could provide tax credits to electric utility customers for the portions of their monthly bills that are going to TMI2 cleanup. Alternatively, government backed loans, similar to the type of assistance provided to the Chrysler Corporation, might be considered. Another possibility, which would be only a partial solution, is legislation which provides Federal funds which match those appropriated to the cleanup by State governments. Pennsylvania and New Jersey are providing such contributions and have included them in their 1984 budgets. In testimony presented recently to other Congressional committees, NRC Chairman Palladino has suggested that consideration be given to having the Federal Government provide cleanup funds, with GPU providing reimbursement when the cleanup is completed and GPU's financial stability improves.

In my view, in addition to the potential safety problems, the cleanup has become a national source of embarassment and certainly must erode the confidence of others that we are a nation capable of expeditiously solving complex technological problems. An approximate analogy can be drawn between the TMI-2 accident and the crash of a commercial aircraft. In both cases the industry, government and public have a vital interest in the causes and consequences of the accident. Unfortunately, in the case of TMI-2, there appears to be no funding mechanism to ensure that information from the damaged fuel and equipment will be expeditiously factored into the operation and design of other nuclear plants. The current situation at TMI-2 is analogous to not immediately undertaking a detailed, comprehensive examination of a crashed airplane. NRC and the industry need to know the information that can only be achieved by prompt cleanup and the removal of the damaged TMI-2 core to DOE laboratories for much-needed study.

Because of the present uncertainty of GPU having adequate funds to carry out the planned cleanup activities for 1985 and beyond, we remain pessimistic about a timely completion of the cleanup, uninterrupted by funding constraints.

This completes my prepared testimony. I will be pleased to respond to your questions.

ATTACHMENT TO NRC STAFF TESTIMONY

SUMMARY OF THE CLEANUP PROGRESS TO DATE AND FUTURE ACTIONS AT TMI-2

Despite five years of effort and some 360 entries into the reactor building, the licensee has only made limited progress in the cleanup and the most difficult and complex work lies ahead. Though some significant cleanup milestones have been achieved, the overall progress to date has not lived up to original expectations. The major accomplishments to date include the following:

- All of the liquid radioactive waste that was generated and collected in the auxiliary building has been processed and the processed water is currently in storage onsite.

- The large noble gas inventory (krypton 85) that collected in the reactor building has been purged to the environment.

- The 650,000 gallons of highly contaminated liquid waste that collected in the reactor building sump has been processed and the processed water is in storage in onsite tanks. There are ongoing decontamination activities (e.g., water spraying) in the reactor building which generate additional contaminated sump water; however, this water is periodically removed for processing to remove the collected activity. Processed water is used for these activities to minimize waste water generation.

- The waste water in the reactor coolant system (90,000 gallons) has been periodically processed by a feed and bleed process to remove dissolved radionuclides.

- Approximately 70% of the contaminated areas in the auxiliary building has been decontaminated, but the most contaminated cubicles were bypassed.

- Shipments of high specific activity abnormal waste to DOE facilities include all 50 EPICOR-II prefilters and all 13 Submerged Demineralizer System (SDS) zeolite liners.

- The leadscrews to the 61 control rods and 8 axial power shaping rods have been uncoupled as a necessary prerequisite to reactor vessel head removal.

- Visual inspections of the damaged core at three different locations were conducted to determine the nature and extent of the damage and aid in defueling planning. Three dimensional sonar mapping of the core has been done.

- The reactor building polar crane has been refurbished and requalified for lifts up to 170 tons. The polar crane is necessary to lift the reactor vessel head and plenum.

- As an aid to planning for reactor vessel head lift, measurements of the radiological conditions underneath the head were taken and yielded levels of 300 to 700 R/hr, with the water level lowered to simulate conditions of a dry head lift. The radiation levels are high but are not expected to prevent a dry head lift.

- Surface washdowns of contaminated walls, floors and equipment have been ongoing in an effort to remove loose or smearable contamination and ultimately lower reactor building atmosphere particulate activity levels. The surface washdowns have not had a measurable effect effect on general area radiation levels. Additionally, previously decontaminated surfaces have become recontaminated from, as yet, unknown sources. The licensee suspects that the recontamination may be due to the operation of the containment fan coolers and the coolers are currently undergoing decontamination.

- The licensee launched a multi-phase dose reduction program in late 1982. This program includes the shielding of known sources of exposure such as floor drains, hatches, penetrations, the enclosed stairwell, and the elevator shaft. These efforts have resulted in significant reductions in dose rate in the general areas, but radiation levels remain considerably above those normally found in operating plants shut down for refueling.

- The licensee has obtained approximately a dozen samples from the core debris bed for offsite analysis of physical, chemical and nuclear characteristics.

As described above, some significant progress has been made in the cleanup and some important milestones have been reached. However, the most complex and difficult work lies ahead as the licensee focuses his efforts on defueling the reactor to place the plant in a much safer condition. The work that remains includes the following:

- The planned dry reactor vessel head lift is scheduled for August of 1984.

- The surface washdowns of the contaminated areas will continue throughout the year in an effort to reduce particulate activity levels in the reactor building atmosphere and ultimately permit workers to shed their respirators and, perhaps, some of their bulky protective clothing. Worker efficiency should improve if and when this goal is reached. Parallel efforts to identify and mitigate the sources of recontamination in the building will also continue. At this point, no one can predict when the building atmosphere will be clean enough to permit respirator removal.

- Dose reduction efforts will continue in parallel with those efforts directed at defueling. Preliminary plans are currently being developed for the removal of the contaminated sludge from the reactor building basement which is totally inaccessible to workers because of the exceedingly high radiation levels.

- Decontamination efforts in the auxiliary building are ongoing.

- Plenum removal is anticipated to begin in mid-1985, following head lift, and will take approximately 6 months if it can be removed in one piece. If destructive removal of the plenum is necessary, the schedule for completion is uncertain.

- Fuel and fuel debris removal is anticipated to begin in early 1986, following plenum removal, and will take at least a year or more to complete.

- Efforts to carry out the removal and subsequent shipment of the highly radioactive purification demineralizer resins are ongoing.

- Packaging and shipment of fuel and other abnormal waste generated in support of defueling activities will begin after the onset of fuel and fuel debris removal.

- Surface decontamination and internal piping system flushes in the auxiliary building will be performed. This could be done over a period of several years.

- Surface decontamination in the reactor building, including the possible removal of badly contaminated concrete surfaces, might require several years of continuous effort.

- Decontamination of the corrosion layer of the piping constituting the reactor coolant system pressure boundary will not begin until the defueling of the reactor vessel and associated piping is complete.

- The licensee is not expected to forward a proposal for the disposition of processed accident water until 1985 or later. One of the options for processed water disposition, controlled and monitored discharge to the Susquehanna River, is currently prohibited by a condition included in the TMI-2 license. At present, the NRC staff has underway studies of the environmental and socioeconomic impacts of a large number of feasible processed accident water disposition alternatives. The State of Maryland also has a study underway to estimate potential impacts on the Chesapeake Bay. Upon receipt of a proposal from GPU these studies will provide the basis for a disposal recommendation to the Commission. The major part of this water, which contains about 2000 Curies of tritium will be required to fill the refueling canal and storage pool until fuel is shipped offsite, which will not be before 1986.

Mrs. LLOYD. Thank you very much, Dr. Denton.

I will have to be out for a few minutes in this hearing, and Congressman Young will be here, and I'll return shortly.

One of the major lessons from TMI was that we were so inadequate in our emergency planning. How has the emergency planning been improved since then? I know we had so many sources that were all experts that brought out so much information that really, I think, hurt our efforts to prove credibility at the time.

In one of my subcommittee hearings several years ago one of the witnesses said that there was more information, more press coverage, of TMI at that time than the entire space program. What have we done for emergency planning to see that that sort of occurrence——

Dr. DENTON. I think there have been major improvements in that area, Madam Chairman. The administration did create a new agency who was responsible for emergency planning, FEMA, the Federal Emergency Management Agency, specifically to address the problems that occurred at TMI due to lack of coordination between local government, State government, and Federal Government. So with that agency now who has responsibility for coordinating all offsite emergency planning, and the NRC's new rules requiring much more attention on this area, I think that area is in much better shape than it was prior to the accident.

Mrs. LLOYD. Do you think that this structure will function to prevent some of the panic and hysteria that occurred after TMI?

Dr. DENTON. I think the structure will function. I would expect there would still be considerable anxiety in any area in which they really had a serious reactor accident.

Mrs. LLOYD. Well, I don't understand some of the planning requirements. Is there a basis for the requirements? Is it intended to save "X" number of lives, or what is the basis for the emergency planning?

Dr. DENTON. It's to prevent as much exposure to the surrounding citizens as can be achieved under the circumstances. So it's based on an early alert, based on symptoms inside the reactor, an early alert to the local government, so that that message, then, goes out to the people who live within the 10-mile radius, so that prompt sheltering or evacuation could take place. So it's intended to minimize any potential for exposure as a result of a reactor accident.

Mrs. LLOYD. Thank you.

Mr. Walker.

Mr. WALKER. Thank you, Madam Chairman.

Dr. Denton, I think that you understand that the funding constraints are one of the most important issues facing your Commission, the Department of Energy, and this committee as we address the problems at Three Mile Island.

I have a letter from Chairman Palladino to Governor Thornberg dated March 19, 1984, and I ask unanimous consent that it be entered into the record at this point.

[Letter to be supplied follows:]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

March 19, 1984

The Honorable Richard Thornburgh
Governor of Pennsylvania
Harrisburg, Pennsylvania 17109

Dear Governor Thornburgh:

I am writing to respond to your letter of January 24, 1984, and the statement of your position as transmitted to us by Dr. Wright in a letter dated December 16, 1983. These letters present your position regarding the restart of Three Mile Island, Unit 1 (TMI-1).

The Commission's current views and plans regarding TMI-1 restart are set forth in the attached Notice to the Parties, which was issued on January 27, 1984. The Notice to the Parties is not intended to be a full explanation of the Commission's position on restart. As stated in the Notice, it was issued only to keep the parties informed, and the current views and plans discussed in the Notice are subject to change, based on consideration of parties' comments on the list of integrity issues and other matters, and on any other important new information.

Your letter suggests that establishment of a funding mechanism for completing the cleanup of TMI-2 should be a prerequisite for restart of TMI-1. While we believe that adequate protection of public health and safety is currently being maintained, the Commission is concerned about the slow pace of the cleanup. We do not believe, however, that holding up the restart of TMI-1 because of uncertainties about TMI-2 cleanup funding will help resolve those funding problems. In addition, the Commission has concluded that it does not have the legal authority to condition restart of TMI-1 on a funding solution for the cleanup of TMI-2.

Nevertheless, we continue to examine alternatives that would help bring about a safe and expeditious cleanup, and we will review what can be done when we address the TMI-1 restart issue. In recent Congressional testimony I have suggested the consideration of new approaches, such as that used for the cleanup of West Valley. I would also like to explore the possibility of obtaining superfund financing for TMI-2 cleanup.

Commissioner Asselstine does not believe that the Commission should request additional legislation, such as legislation similar to the West Valley Demonstration Act, to provide large-scale Federal funding for the cleanup of TMI-2. In his view, any legislative proposals of that type should come from other Federal agencies that have more direct responsibilities for such initiatives. Commissioner Asselstine also believes that the likelihood of favorable Congressional action on a Federal funding program for the TMI-2 cleanup is not high. Furthermore, he is concerned that a Commission legislative proposal for Federal funding of the cleanup would serve as a disincentive to obtaining the additional voluntary financial commitments that are an essential part of your plan for funding the cleanup.

The Commission agrees that issues of management competence and integrity should be resolved prior to a decision on restart, and is trying to do so. The adjudicatory proceeding to determine whether TMI-1 should be allowed to restart, begun in 1979, is still underway. While there are no evidentiary hearings currently in progress, the Commission's Atomic Safety and Licensing Appeal Board is in the process of reviewing the Licensing Board's decision on the management issues and the cheating incidents. This process is termed the "merits review," and any decision by the Appeal Board will then be considered by the Commission.

The question presently before the Commission on management issues is whether those issues justify continuing the immediate effectiveness of the original shutdown orders prior to completion of the merits review. In resolving this question, the Commission must decide whether it now has sufficient information to conclude that the management problems which led to the issuance of the immediately effective shutdown orders have been corrected and there is reasonable assurance that the plant can and will be operated safely.

While the Commission can, as part of this review of whether or not to lift immediate effectiveness, require the temporary separation of certain individuals from nuclear operations, it cannot permanently revoke the TMI-1 license or permanently bar individuals from working at TMI on the basis of the review of immediate effectiveness alone. The decisions the Commission can reach on the basis of this review of whether or not to lift immediate effectiveness are either to authorize restart, with any appropriate conditions, prior to completion of the merits review, or to allow the merits process to be completed prior to making a final decision.

As indicated in the attached Notice to the Parties, our purpose is not to separate competence and integrity issues from the restart decision but rather to resolve them. A decision on restart, when it is finally made, will be accompanied by an explanation of the manner in which the Commission took account of the issues of integrity and competence, as well as hardware.

Sincerely,

Nunzio J Palladino

Nunzio J. Palladino

Attachment:
As stated

Mr. Walker. The letter says, in part, and I quote, "The Commission has concluded it does not have the legal authority to condition restart of TMI 1 on a funding solution for the cleanup of TMI 2."

Now if that's the position of the Commission, how can we best assure adequate funding for the completion of the cleanup?

Dr. Denton. I wish I knew the answer to that, Congressman. We've been groping with that problem, as you have, for a number of years. I'm in favor of all suggestions to expedite the cleanup.

The Commission has examined that question, and it has determined, as you have said, in their letter to the Governor that it doesn't have a legal basis to link the funding to the restart decision.

Mr. Walker. OK. That would be basically a formal arrangement of some sort. You don't have the legal basis to do it. Could you have some kind of an informal arrangement in a restart order that would perhaps not be binding, but at least would indicate that NRC feels strongly that money generated from TMI-1 ought to go into the cleanup of TMI-2?

Dr. Denton. I'm sure the Commission could do that, but whether it would have the force of law or not is another question. The chairman has been outspoken on this issue before industry groups and public utility commissions, so his views about the need to accelerate the cleanup are well known, but we've not found a legal way to try it.

Mr. Walker. My understanding in informal conversations I've had with the company, and I would assume that what the company would tell us here today, is the fact that they are certainly willing to see that kind of a linkup made; that it's what they intend to do.

I think, however, that for many of the constituents that I represent and people who are in the immediate area around the plant, they would like to see some sort of an acknowledgment that NRC also regards that as important. Now if, in fact, the Commission cannot do it in a formal, legal sense, it seems that the Commission ought to at least have the ability to try to make certain that that linkup is an implied part of the restart decision through some kind of an informal arrangement. Do you think that's at all possible?

Dr. Denton. Let me ask Mr. Lake Barrett to comment on that.

Mr. Walker. Fine.

Mr. Barrett. It is my understanding that the Pennsylvania Public Utility Commission had already worked that into the decision they made in January 1982, I believe, which established the rates, and revenues from unit No. 1 would go to cleanup.

Mr. Walker. Well—and I think that's the case. However, once again, wouldn't it be of some usefulness for NRC to at least, as a part of the restart, acknowledge that arrangement?

You know, the legal question surrounds your ability to usurp the powers of the PUC largely here. I mean, that's the legal question involved. If, in fact, the PUC has already made that decision and you feel that that is a decision which does link the two together, couldn't the order in some way acknowledge that particular decision, so that it's clear that NRC is making a restart decision based, at least in part, on the need for money to go into the unit No. 2 cleanup?

Dr. **Denton**. I think if the company were to make such commitments, they could be acknowledged, but I think the Commission would not want to rely on something that they couldn't enforce. If, in fact, the situation were such that the company had said that was going to be the case, and the PUC had made it come true by their authority in that area, I would think the Commission could give it some weight.

Mr. **Walker**. Well, but from the standpoint of those of us who are the nontechnical people in this field, if you in fact make a decision that doesn't even acknowledge that there's a linkup, then the legal ramifications of that in the future could be that the NRC didn't really acknowledge the linkup, so, therefore, didn't even think that that was important.

Now I think that the dialog here, the dialog that we've had with other people that have appeared before the panel today, makes it quite clear that that linkup is an extremely important part of all of this; that without the funding stream to accomplish unit No. 2 cleanup, we are in big trouble; and that one important part of that funding stream may have to be revenues generated by unit No. 1. As a matter of fact, that's been a part of everyone's plan. No one has had a plan that doesn't have that in it.

Now, you know, if you approve a restart of Three Mile Island unit No. 1 without even acknowledging that's a part of the facts of the case, then at some later point someone could point back at that and say, "Well, NRC never intended for the revenues to be generated." I'm not talking about the company here; I'm just saying that somebody in the industry interpreting what took place, as we look back at the industry, could make that kind of an interpretation. That would be a wrongful interpretation.

Shouldn't at least we have some acknowledgment, some formal—if not a formal arrangement, some informal arrangement, that at least shows that there was an NRC acknowledgment of the facts of the matter?

Dr. **Denton**. I think the Commission is aware of this funding situation. They have been briefed by Mayor Morris and others, and the issue on the restart is pending before the Commission itself.

Mr. **Walker**. Sure.

Dr. **Denton**. To what extent they would put in place such an acknowledgment, I really can't speak for the Commission today.

Mr. **Walker**. OK. Thank you.

Dr. **Denton**. But I certainly understand the concern among the local citizens in your area, Congressman, who just can't perceive why the Federal Government is unable to move forward with a cleanup in a more expeditious manner.

Mr. **Walker**. Do you think this ought to be given the same level of importance as the West Valley project?

Dr. **Denton**. The West Valley project had many of the same elements, and there was one difference, I guess, and it depends on how you weigh that. West Valley did include some Government-owned fuel, but, otherwise, it was to ship back to the powerplants the fuel that had been shipped there to be stored and reprocessed.

Mr. **Walker**. Well, I guess—in other words, though, the similarities are more in evidence than the dissimilarities between the two cases?

Dr. **Denton**. Let me ask Dr. Snyder if he'd like to comment on that.

Dr. **Snyder**. I don't claim to have any great expertise on the West Valley situation, except for the fact that there was a significant amount of the processed wastes of the remaining stream from reprocessing liquid wastes which were, in fact, Government-owned materials. There is that difference between the situations.

I would agree with, I think, what the intent of the question is, and that is that there is in both cases the potential of a health hazard for the public from both sites, and, therefore, something that is legitimately the concern of the Federal Government.

Mr. **Walker**. Well, in fact, the justification for our involvement at West Valley has been in large part the public health and safety aspects——

Dr. **Snyder**. Yes, sir.

Mr. **Walker** [continuing].And not that we had any kind of responsibility as a result of Government waste onsite. It has been the public health and safety. What I'm saying is that in terms of public importance I think we should be able to acknowledge the cleanup of Three Mile Island is on a scale just as important in terms of public health and safety issues.

Chairman Palladino's letter refers to a number of outstanding issues concerning management competence and integrity at Three Mile Island. Since those are all issues that can deeply affect the research and development program which is authorized by this committee, would you update us on the status of each of those issues?

Dr. **Denton**. I don't have a copy, Mr. Congressman, of all those issues, but I can summarize where it stands. There were a number of investigations that were outstanding early in the year, one such as the Keaton Report, some of the charges of harassment and intimidation that had been raised at the site, the concerns over the RHR Beta Report, socalled. All of the investigations have now been completed and will be considered tomorrow by the Commission in closed session and released to the public for a period of comment.

So I think all the investigations, going back to the time of the accident, that go to that period and to the period since that time, will be available for public comment, and the Commission will be able to consider the results of those findings in its final determination.

Mr. **Walker**. Do you suppose that we could get copies of the information as considered by the Commission and the Commission's determinations, after, of course, that has been done, for the record of this hearing?

Dr. **Denton**. I am sure it could be done.

Mr. **Walker**. OK. I would ask unanimous consent that that material be included in the record at the point that it is transmitted to us by the Commission.

Dr. **Denton**. It's quite voluminous. I don't know if you want it in the record, because I think it's many feet tall, but we certainly would make it available to the committee.

Mr. **Walker**. I think what we would want for our purposes is summaries of the findings rather than the whole volume of the materials. We'd simply look to get summary material on it.

Dr. DENTON. One point I should—they will be made available to the extent that the Department of Justice concurs in their being made available, and there may be some parts that are not released tomorrow.

Mr. WALKER. I understand, and I think most of that problem would probably be overcome by allowing you to summarize it, anyhow, wouldn't it?

Dr. DENTON. All right.

[Material to be supplied follows:]

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

DOCKETED
USNRC

July 10, 1984

'84 JUL 11 P1:04

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BRANCH

The Honorable Richard Thornburgh
Governor of the Commonwealth
of Pennsylvania
Harrisburg, PA 17120

DOCKET NUMBER
PROD. & UTIL FAC. 50-289
(Restart)

SERVED JUL 11 1984

Dear Governor Thornburgh:

This responds to your letter of June 14, 1984, in which you requested that the Commission postpone any decision on TMI-1 restart until adequate funding has been assured to complete the cleanup of Unit 2 and the NRC has provided adequate assurances that Unit 1 can be operated safely.

The major concern expressed in your letter is that because of the cleanup funding impasse the condition of TMI-2 could pose a threat to the safe operation of Unit 1. As you are aware, the Commission for some time has been concerned about the pace of the cleanup efforts and in many forums has advocated that cleanup be conducted on an expedited basis. We note that the recent Edison Electric Institute decision waiving the $100 million requirement before utility contributions would begin should provide significant additional money for the cleanup.

With regard to whether Unit 1 can be safely operated in view of the condition of Unit 2, many of your concerns were addressed in the TMI-1 restart proceeding. In the Commission's Order of August 9, 1979, which established the scope of the restart proceeding, the Commission specifically asked the Atomic Safety and Licensing Board to address the question whether decontamination operations at TMI-2 would affect safe operation of TMI-1. Although the Commonwealth of Pennsylvania did not present any direct evidence in the hearing on this issue, it participated in cross-examination and filed proposed findings of fact and conclusions of law with the Licensing Board on the matter. The Commonwealth chose to limit its proposed findings to two specific concerns: (a) offsite disposal of low level radioactive waste, and (b) separating the fuel handling buildings.

After considering the evidence presented in the proceeding, the Licensing Board in its Partial Initial Decision of December 14, 1981 held that, subject to licensee's compliance with four conditions which it imposed, it was satisfied that Units 1 and 2 were sufficiently separated so that the cleanup of Unit 2 should not interfere with the safe operation of Unit 1. No party to that proceeding, including the Commonwealth, appealed those findings.

With respect to other safety issues, the Licensing Board and the Appeal Board have both issued comprehensive opinions on the many safety issues that have been raised in the restart proceeding. The Commission has taken review of several hardware issues addressed by the Appeal Board and expects to issue its opinion on those safety issues in the near future. The Commission is presently considering whether to review the Appeal Board's decision on the management issues, in which the Appeal Board reopened the record on three issues, and how further to proceed in that area. The Commission will not authorize restart of Unit 1 until it has reasonable assurance that the plant can be operated consistent with the public health and safety. When the Commission makes a decision it will fully explain how the safety issues have been resolved.

In your letter you also requested that if the Commission decides to make a TMI-1 restart decision at this time, you would like to appear personally before the Commission on behalf of the Commonwealth of Pennsylvania to discuss issues of concern to you. Prior to the time the Commission makes a restart decision, it will afford you the opportunity to make a presentation at a public meeting if you still desire a meeting. At the appropriate time, we will contact you and schedule such a meeting.

Sincerely,

Nunzio J Palladino

Nunzio J. Palladino

COMMONWEALTH OF PENNSYLVANIA
OFFICE OF THE GOVERNOR
HARRISBURG

THE GOVERNOR

June 14, 1984

Dr. Nunzio J. Palladino
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Palladino:

I am writing in response to the commission's inquiry of June 1 concerning the proposed restart of the undamaged Unit 1 nuclear generating facility on Three Mile Island. You asked whether the Commonwealth of Pennsylvania feels that a commission vote on restart would be appropriate at this time.

The answer is no.

On several occasions since the accident of March 28, 1979, I have expressed to you and others my opposition to any restart vote unless and until adequate funding has been assured to complete the radiation cleanup of the damaged Unit 2 facility on TMI, and unless and until the NRC has provided adequate assurances that Unit 1 can be operated safely.

My safety concerns, and those expressed by others, have involved a number of questions relating to such areas as the quality of staffing, training and monitoring at the plant site, the physical quality and condition of the plant itself, and operator competence and integrity.

While it is true that progress has been made in several of these areas, I must advise you, once again, that adequate safety assurances have not been fully provided to me, or to the people of Pennsylvania, regarding the restart of TMI Unit 1.

Nor has sufficient funding been assured for Unit 2 decontamination, and the Unit 2 cleanup impasse has become, in itself, a potential threat to the safe operation of Unit 1. I have instructed Commonwealth attorneys to formally introduce that impasse as a new safety issue in your restart proceedings.

As early as June 22, 1979, I urged the commission to postpone any Unit 1 restart decision until, among other things, "Questions about the wisdom and safety of operating Unit 1 next to the crippled Unit 2 have been answered." That postponement occurred.

Among other things, the commission ordered in August 1979 that no restart be authorized until "The licensee shall demonstrate his managerial capability and resources to operate Unit 1 while maintaining Unit 2 in a safe configuration and carrying out planned decontamination and/or restoration activities (emphasis added)." I was understandably encouraged by that 1979 language.

In the nearly five years since that time, however, the commission has done little to address the Unit 2 question. It has attempted, in fact, to disclaim responsibility for the legacy of radiation left to us by the worst accident ever to occur within its regulatory sphere.

On March 19 of this year, you informed me by letter that "the commission has concluded that it does not have the legal authority to condition restart of TMI-1 on a funding solution for the cleanup of TMI-2."

In my view, the commission not only has the authority, it has a legal responsibility to condition the restart of Unit 1 on the removal of any threat to the safe operation of that facility. Your own timely warnings have contributed to my conclusion that the Unit 2 situation is, indeed, a potential threat. Two years ago, you advised the U.S. Senate Subcommittee on Nuclear Regulation that "the potential for slow degradation of containment integrity and equipment capability plus the increasing concern for an unexpected release of radioactive material" argue for a more aggressive and expeditious Unit 2 cleanup program. You added in an enclosure attached to your letter that, "If TMI-2 is allowed to remain in its present condition over the long term, accidents involving the public have a greater possibility for occurrence. The potential for these adverse events, although small now, will increase with time as TMI-2 equipment deteriorates."

If the potential for an "unexpected release of radioactive material" from Unit 2 is increasing "with time," and if the cleanup that would prevent such a mishap continues to be delayed for lack of funding, then the commission has an obligation to consider what effect such a release would have on the staff, management, instruments and other resources necessary to a safe and fully operational Unit 1.

Is it realistic to assume, for example, that the work environment at TMI-1 would not be affected by a genuine radiation emergency, less than 200 yards away, at TMI-2? Or would it be more reasonable to assume that a new emergency at Unit 2 could produce any number of reactions at Unit 1, ranging from mere distraction to panic or even actual injury? Could such a development confront us with a double crisis of unprecedented dimensions: an operating nuclear power plant, suddenly abandoned or understaffed, on an island poisoned by escaping radiation?

I believe the people of this area deserve answers to these questions.

Surely you agree that it would be irresponsible for any Unit 1 restart vote to be taken without a thorough investigation into the consequences of a new radiation emergency at Unit 2, and without the identification and implementation of any and all steps deemed necessary to protect the health, safety and peace of mind of our people and the integrity of our environment should such an emergency occur.

More to the point, it is inconceivable that the NRC would entertain a restart motion before the only real guarantee for avoiding a twin catastrophe, spawned by the accidental release of the radioactivity now trapped at Unit 2, has been assured. I refer, of course, to full funding of the safe and expeditious removal of that source of radiation.

The cleanup lacks sufficient funding at this point primarily because a major partner in the national TMI cost-sharing plan I advanced three years ago has yet to deliver on even a portion of its commitment. That partner, the national electric utility industry, pledged in September 1981 to contribute $192 million for TMI cleanup at a meeting in Kansas City at which I personally made the case for the national cost-sharing approach.

Since then, approximately $83 million in pledges have been made to the industry's principal trade association by individual companies, but this is $17 million short of a $100 million "trigger" the industry placed on its previously "unconditional" commitment.

Very frankly, the industry's obvious interest in restarting Unit 1 and avoiding a potential bankruptcy within its ranks was a substantial motivating factor in the commitment it made in Kansas City.

The industry's failure to deliver on that commitment places added financial pressure on TMI's operator, which could further compromise its ability to operate Unit 1 while sustaining cleanup of Unit 2. Surely neither of us can possibly regard this as acceptable.

While your recent personal efforts to persuade the industry to honor its commitment are appreciated, those efforts, to be truly productive, must be backed by the regulatory responsibility of the commission to withhold any vote on Unit 1 restart until all major safety issues, including Unit 2 cleanup funding, have been satisfactorily addressed and resolved.

On behalf of those who live within the shadow of TMI, and those who believe that public health and safety and environmental integrity must be our first concerns, I once again urge you to postpone any decision on restart.

When the benefits, primarily economic, of restarting TMI-1 are weighed against the potential health, safety and environmental risks of a premature restart, the proper course appears to me to be clear. If you and your colleagues are determined to make a final decision at this time, however, I hereby respectfully request the opportunity to personally appear before the commission on behalf of the Commonwealth of Pennsylvania.

Sincerely,

Dick Thornburgh
Governor

Mr. **Walker**. It is the position of the Commission that no decision will be made on restart of unit No. 1 until all outstanding issues are resolved?

Dr. **Denton**. I think that's a fair way to characterize it in general, but it's issues that they see as issues, and they have published a list of issues. So if you take it—it would be their definition of issues, that is certainly correct.

Mr. **Walker**. Based on the new funding for the cleanup that was just announced, do you believe the schedule can be completed in a timely fashion?

Dr. **Denton**. Let me ask Mr. Snyder to——

Dr. **Snyder**. The funding that was announced really just goes for this current calendar year. We see in our analysis of it, of the overall situation for future years, there being considerable shortfall. As Harold Denton mentioned earlier, we—our analysis shows about $200 million shortfall from now until the end of the cleanup, including this 1-year peak in 1984. And when we call—our definition of a shortfall is that the moneys aren't formally committed, so we don't count any money from EEI, for example, in making that analysis.

So it's fairly conservative analysis, but I think a proper one for our agency to make.

I think that we're very pleased that the funding has been upped for 1984, and we're also pleased with the actions that the company has underway that we're aware of to try to expedite fuel removal, and we'll do everything we can to support that.

But I am very concerned that in 1985 and beyond that roughly half of the money isn't there. And if you get a fast start now, will there be funds to sustain it? I don't know the answer to that question, and I'm not sure anyone does.

Dr. **Denton**. I've talked often, Mr. Congressman, to utilities and to representatives of PUC's about the value and obligation, as I would see it, to make sure industry contributes their share, but I think that's the contribution that we're not counting, and that's the $200 million that other people might count to be firm, and yet we don't count that in our summary, since it has not actually come to pass.

It's very difficult to try to persuade a PUC member from another State that, in view of the rate increases going in his own State, that he should permit contribution outside his State.

Mr. **Walker**. How critical have the delays been so far at Three Mile Island, and how critical will they become once the reactor head is removed?

Dr. **Snyder**. Well, there are some notable examples, I think, of the problems that have arisen. I wouldn't call them critical problems, but I think there is, to a certain degree, an increase in the potential worker exposure because of the delays in containment, particularly inside the containment building, in getting at the surface contamination that has remained there for well over 5 years.

I think, also, that even though once the head is off, I am confident—in fact, our approval for removal of the head will be contingent on being convinced that if there were a delay to occur after the head is removed, that the plant can still be retained in a safe posture. Whether the head has to go back on or not is an open question.

But I think it would be unfortunate, if nothing more, than if the defueling got under way and then it had to be discontinued.

So it's very difficult to quantify the risk that's involved with delay. In fact, I don't think anyone can really do that. I think it's really just basic common sense—the longer it sits there, the greater the risk there is to the workers and potentially to the public.

Mr. **Walker**. Let me ask you this: Do you think that there would be a go-ahead given for removal of the head if we didn't think that there was a funding stream in place that would allow all of the fuel to be removed?

Dr. **Snyder**. Well, that's a question that we have under review right now, and our own—my office's view on that, myself included, is that as long as there is some funding in place, and we know that there is some for 1985 and beyond, that it would be wrong for us to hold up until all the money was in the bank, so to speak.

I'm afraid that this job is one that's going to limp long, and if you wait until you have all the money, you'll never make any progress at all. I think it's important to get the information on the condition of the core. I don't think there's any safety concern. If—if absolutely—if there's an all-stop after the head is removed, we're convinced, and we've asked the company plus an advisory group to the company to look at that question, and I'm fairly certain that the head could be replaced. It would be very unfortunate, but I think it could be done, if need be.

I don't think it's reason to hold up, because that information is so valuable.

In fact, you could turn the question around a little bit: if they get started on it and they make good progress, and there will be considerable amount of useful information coming out of that from the R&D program funded by the Department of Energy, it may very well be more of an encouragement to others to contribute. They'll see real, hard information coming out, something like the under core TV pictures which you saw a little bit of earlier today. That is invaluable information.

Mr. **Walker**. Can you tell me how much money that the Nuclear Regulatory Commission has available each year to conduct its research?

Dr. **Denton**. I think it's been going down. We had requested, I believe, on the order of $140 million for the total NRC research, including research for both reactors and nonreactor materials. I think that has been—the Appropriations Committee has proposed to reduce that by about $30 million for this fiscal year. That's under consideration by the Congress.

Mr. **Walker**. And much of that money, I assume, is tied up in ongoing projects? My question is, why doesn't—why wouldn't it be logical for the Commission to assume a portion of the funding on the study of the damaged reactor core?

Dr. **Denton**. I think the Commission had intended to participate with—in funding DOE's examination of the core once the core was removed, but we had, in one of our appropriation bills, a prohibition about spending any money on the cleanup itself.

But we had—and we do intend to fund some parts of DOE's examination of the core, but primarily to rely on DOE for the core examination.

Mr. **Walker**. Well——

Dr. **Denton**. I think the funding was—that was being considered was on the order of $1 to $3 million.

Mr. **Walker**. Yes. Well, I guess the question is whether or not that's cleanup. I mean, I can understand why that prohibition would be there on active involvement in the cleanup process, but, once you have the materials and it has gone to the laboratory in Idaho, that at that point is not cleanup. And, yet, it would free up some funding for DOE to be able to use for other things if they didn't have to put the money into the actual study at Idaho.

Dr. **Denton**. I think DOE would like for NRC to pick up a bigger share of the examination once the core is removed to Idaho, for example, and they were considering, and still are, what the appropriate level would be. But it's been—the kinds of numbers that have been talked about have been in the $1 to $3 million range because the research budget is so constrained and general.

Mr. **Walker**. Thank you, Mr. Chairman. That's all the questions I have at this moment.

Mr. **Young** [acting chairman]. OK. Fine, Mr. Walker.

Well, thank you very much, Dr. Denton.

I guess our next witness will be Mr. Kuhns, chairman and chief executive officer, General Public Utilities.

Mr. Kuhns, without objection, your statement will be made a part of the record and you can summarize, sir——

Mr. **Kuhns**. Thank you, Mr. Chairman.

Mr. **Young**. In any fashion that you like.

STATEMENT OF WILLIAM G. KUHNS, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, GENERAL PUBLIC UTILITIES CORP., ACCOMPANIED BY PHILIP R. CLARK, PRESIDENT AND CHIEF EXECUTIVE OFFICER, GPU NUCLEAR

Mr. **Kuhns**. Mr. Chairman, Congressman Walker, we do appreciate the opportunity to respond to your invitation to be here to discuss the changes we have made in our nuclear activities since the accident at TMI-2 and to report the progress and problems in the cleanup of unit No. 2.

Let me say, first, that as the owners of both units No. 1 and No. 2, we accept particular responsibility to respond fully and effectively to all the lessons from the event of that accident, and we believe we are doing so. We are also deeply committed to the safe and timely cleanup of the damaged TMI-2 plant, so as to remove the risks it poses to the public.

GPU has completely restructured and strengthened its nuclear activities. We have established a separate company, GPU Nuclear Corp., responsible for all of our nuclear activities and for nothing else. We have provided a substantial degree of separation of that nuclear company from our other activities by providing full-time management and by obtaining four outside members for the GPU Nuclear board of directors, including an outside chairman of the board, Mr. John O'Leary, who is with us here today. We have also established a Nuclear Safety and Compliance Committee of that board composed entirely of outside members.

The president and chief executive officer of GPU Nuclear is on my right, Mr. Philip Clark, and he will summarize our response to the items in your letter. Also, Mr. Edwin Kintner, executive vice president of GPU Nuclear, is here; and on my left, Mr. Byron Cherry, vice president of planning for GPU, who has assisted and worked hard on the funding effort regarding the cleanup.

Mr. Clark and Mr. Kintner have joined GPU since the accident, Mr. O'Leary, too, as a matter of fact, as part of a major increase in our managerial and technical resources applied to nuclear activity. Biographies of Mr. Clark, Mr. Kintner, and others are attached to my testimony, and of course we will all be available to answer your questions.

Let's talk a bit about the funding first. Since July 1981, the focus for the efforts to provide cleanup funding has been the plan proposed by Governor Thornburgh of Pennsylvania at that time. Considerable progress has been made in obtaining many elements of the funding envisioned in that plan. Yet, as we have heard here today earlier, the major element not yet in place and, accordingly, for which no funds have been supplied, is the U.S. electric utility industry portion. The plan calls for $190 million from the industry. They committed to undertake a voluntary effort to provide up to $150 million. They start to flow the money once they have reached $100 million. They are at $83 million today, that amount having been pledged by 41 of EEI's 126 members.

We and they, the EEI leadership, are intensifying our efforts to obtain the balance of those industry commitments. We know others, including Governor Thornburgh, Chairman Palladino, Secretary Hodel, and Members of Congress—and we are grateful for that—have also been urging the industry to participate.

Many of the utilities which have not yet pledged have significant problems of their own, at least as they see. In some cases, this involves pressure or direction from the public utility commissions or from other State officials opposing participation in the cleanup effort. It is also unfortunate that adverse political attitudes about nuclear power seem to be interfering with the self-interest of the nuclear plant owners and their customers and stockholders in learning the many remaining lessons from the cleanup of TMI-2. The decision by the Japanese to participate is direct recognition of the value to the industry of these lessons.

In addition to seeking efforts related to investor-owned utilities, we are looking for ways to obtain support from nonutility industries. In that regard, I should mention in passing—it is in my testimony—the Bechtel arrangement with us. With them as our prime contractor on the cleanup, it involves their working with us at reduced rates, which to date has represented a contribution to the cleanup of about $10 million. This is expected to escalate to about $20 million during the course of the cleanup. This is not new money in the sense that this arrangement was counted on in developing the $1 billion cleanup cost estimate, but I think it should be recognized as a real industry contribution.

The other element of the Thornburgh plan where the fund has not yet reached the planned level is the Federal Government R&D

support. This was targeted in the Thornburgh plan at $190 million. To date, DOE has budgeted a total of about $160 million for R&D on TMI-2. Much of that total has been, and is being, spent on R&D efforts related to TMI-2 but carried out offsite. That portion of the funds, while certainly useful, was not reflected in the TMI-2 cleanup costs dealt with in the Thornburgh plan and, thus, provides no funding for those costs. Up to about half of the identified DOE funding is now expected to be spent by the end of 1985 in ways that both constitute R&D and contribute directly to cleanup progress.

There is a great deal of R&D value in work to be done after 1985. Assistant Secretary Brewer's letter of April 17, 1984, which will be furnished to this committee, recognizes that very clearly and encourages the industry to get on with their piece of the funding program.

We suggest that such continued support from DOE, encouraged by this committee, be based on assuring completion of identified R&D efforts of national interest. We also believe that there is significant R&D value to NRC safety programs to be obtained from unit 2. We understand to date that the NRC has not devoted any of its R&D funds to learning directly from the accident.

As was referred to earlier today, in order to increase momentum in the cleanup, GPU has just accelerated the work planned for 1984 by advancing $10 million. This, plus an additional $5 million from the DOE and $3 million from the Japanese, gives us $93 million in 1984. This is 20 percent greater than the funding in 1983 and will allow us to proceed effectively toward removal of the fuel core.

The total funding required for 1985 is, indeed, not yet assured. In fact, since our insurance funds will be exhausted in 1984, continued progress in 1985 requires that other funding sources be in place. We promise continued efforts to that end. In that regard, under existing ratemaking orders, restart of TMI unit 1 would increase funding of the cleanup by GPU's Pennsylvania customers to the full Thornburgh plan level. It would also improve the financial condition of GPU and permit us to consider advancing additional funds again in 1985.

I would now ask Mr. Clark to turn to the specific questions in your May 11 invitation to appear at this hearing.

Mr. CLARK. Mr. Chairman and members of the committee, I am pleased, also, to be here to report to you today on what GPU has done in its nuclear activities and on the TMI-2 cleanup program.

There have been a great many lessons learned from the TMI-2 accident. I will address myself today to those three listed in your invitation; namely, organization, training, and use of simulators.

As Mr. Kuhns indicated, GPU's nuclear activities have been completely restructured and strengthened. Those changes were initiated by the company to consolidate its nuclear capability and to enhance our effectiveness in dealing with the unique technical and operational aspects of nuclear activities. The changes are based on a careful review of the Kemeny and Rogovin reports, as well as on our own studies.

We now have an integrated organization with full responsibility for all of GPU's nuclear activities, and with no other responsibilities. We also have a highly qualified director in charge of each plant who is an officer of the company and is located full time at the site.

Today GPU Nuclear has 2,600 people, and we have applied to TMI-1 about three times as many people as were applied before the accident.

Included in my testimony are two charts which show, I think, fairly graphically the changes that have been made and address a concept which some people seem to not yet have recognized, and that is that we have a new company. Those charts show that the top four levels of management who were responsible before the accident for operating TMI-1 and 2 are no longer involved in GPU's nuclear activity. In addition, both I, as president, Mr, Kintner, as executive vice president, and 7 of the 11 other senior people reporting directly to us in GPU Nuclear have joined the company since the accident. Thus, we really do represent new people, new talents, and new capabilities.

We recognize that training is of great importance in our nuclear activities and there have been major changes made since the accident. One of the most important and most visible of those training programs is that for licensed operators. There have been numerous changes made in that area, including some mandated by the Nuclear Regulatory Commission after the accident.

We have, of course, complied with the mandated changes, but we have gone far beyond them. I think two things which would illustrate that our training staff today is over 100 people compared to about 15 before the accident. In addition, we have gone to a full six-shift rotation, which means that we always have one-sixth of the people available for training. That six shifts represents a major commitment of resources by the company.

We are also continuing to review and improve our training programs.

With regard to the use of simulators, we agree that they are a most important tool in the training program. We currently use the simulators at B&W and General Electric, although we have placed an order for a simulator for TMI-1.

I think we also pay a great deal of attention to the way the simulators are used. We preplan each of our simulator training sessions. Senior management goes to the simulator and observes, and we, in fact, give an examination to the people before they leave the simulator, and we have an ongoing program of our own evaluation of the simulator training.

One other element we think is important is what we call a basic principles training. This is a small simulator which does not represent the entire control room, but is much more effective in teaching the operators the significance and the understanding of what's happening in the plant. We have such a basic principles trainer installed at TMI. It's being used in the training program today, and we have one scheduled for delivery for Oyster Creek in late 1984.

Returning to the TMI-2 program, we have progressed to the point where we're doing direct work on the reactor vessel itself in preparation for removing the damaged core. That removal of the core is the most significant remaining step in our entire effort. It will substantially reduce the remaining risk to the public.

As described in my statement, to get to this point we have undertaken and completed two major steps. One is to clean up the radioactive water in the basements of the buildings, and the other is to make significant progress in reducing the radiation levels within the containment building so as to allow access by people.

No one is more interested in completing the cleanup than GPU. It was to that end that we started early this year a reassessment of the schedule for the cleanup. That has led to a revised scheduled with an objective of starting removal of the fuel by the middle of 1985. That revised schedule is facilitated by the funding that has been discussed here earlier today, with the additional $18 million in 1984.

I'd like to say at this point that overall both the Department of Energy and the NRC have attempted to be constructive throughout the cleanup program while still fully discharging their own responsibilities relative to TMI-2.

Preparations for the defueling to this point were dramatically slowed by allegations made in March 1983 by three TMI-2 employees. Investigation of those allegations indicated procedural problems, but that they had little, or no, safety significance. Those problems have been corrected, and I think, most importantly, no work has been done unsafely.

While it's hard to be precise, those allegations, the extensive investigations, and the resulting effect on the organization of people contributed to a schedule slippage of a year. It is that slippage that we are now attempting to recover with our new program.

I think it's important to recognize that, as a result of the significant decay of radioactivity with time and the removal of the majority of the radioactivity which had been distributed throughout the plant by the accident, risks to the public from TMI-2 have been greatly reduced over the last several years.

The reactor now requires no external cooling. It's operating at temperature and pressures far below those it was normally designed to operate at, and there is much less radioactivity and much less energy there in order to disperse that radioactivity in a way that could threaten the public.

The Safety Advisory Board, a group of nationally known experts we've assembled to provide an overview of TMI-2 safety, has confirmed recently that the risk to the public has been dramatically reduced by the progress on the cleanup to date.

In summary, on TMI-2 the majority of the radioactivity dispersed through the plant by the TMI-2 accident has been collected and shipped offsite. The damaged reactor is shut down, quiescent, self-cooling, with no significant source of energy to cause further release of radioactivity. Thus, risks to the public have been significantly reduced.

Steps are being taken to expedite removal of the damaged reactor core and move the cleanup back toward the schedule in place before the whistle-blowing incidents of 1983. What is needed now is assurance of continued funding to carry out the program.

In response to the request in your invitation, we do have several recommendations to make to the subcommittee. They are not new in the sense of suggesting actions in areas where you have not already been paying attention. They, rather, suggest continued, perhaps intensified, efforts in areas in which you have already been active. Nonetheless, we believe today's circumstances are different than the past. It's now 5 years since the accident. A decision by the NRC on restart of the undamaged unit 1 seems to be perhaps at hand.

Restart is a key step in assuring that GPU remains strong enough financially to carry out cleanup in a timely way.

Finally, assured funding for the cleanup of TMI-2 seems attainable but needs a major final effort. In that light, we recommend that the subcommittee within your purview or jurisdiction continue to actively encourage and support, first, NRC's effort to reach a timely decision on restart of TMI-1 on its own merits independent of other issues; two, continued Federal funding sufficient to complete the identified R&D tasks and fully capitalize on the significant learnings from TMI-2 which are of national interest; third, completion of an overall program providing assured funding for cleanup; finally, continued appraisal of NRC regulations and criteria applied to the cleanup to assure they are appropriate for the unusual conditions of TMI-2 and recognize the contribution that timely completion of the cleanup will make to public safety.

Again, I appreciate this opportunity to appear before the committee, and we'll be happy to respond to any questions.

Thank you.

[The prepared statements of William G. Kuhns and Philip R. Clark follow:]

STATEMENT
OF
WILLIAM G. KUHNS
CHAIRMAN AND CHIEF EXECUTIVE OFFICER
OF
GENERAL PUBLIC UTILITIES CORPORATION

MADAM CHAIRMAN AND MEMBERS OF THE COMMITTEE:

We appreciate the opportunity to meet with the Committee today to discuss the changes we have made in our nuclear activities since the accident at TMI-2 and report the progress and problems in the cleanup of TMI-2.

First, let me say that as the owners of TMI-2, we accept particular responsibility to respond fully and effectively to all the lessons from that event, and we believe we have done so. We are also deeply committed to safe and timely cleanup of the damaged TMI-2 plant so as to remove the risks it poses to the public.

General Public Utilities Corporation has completely restructured and strengthened its nuclear activities. We have established a separate company, GPU Nuclear Corporation (GPUN), responsible for all of our nuclear activities and for nothing else. We have provided a substantial degree of separation of that nuclear company from our other activities by providing full-time management and by obtaining four outside members for the GPUN Board of Directors -- including an outside Chairman of the Board. We have also established a Nuclear Safety & Compliance Committee of that Board composed entirely of outside members.

The President and Chief Executive Officer of GPU Nuclear, Philip R. Clark, is with me today and will summarize our response to the items in your letter. Also with me today is Edwin E. Kintner, GPUN Executive Vice President. Both of these men joined GPU since the accident as part of a major increase in our managerial and technical resources applied to nuclear activities. Biographies of these individuals are attached to our testimony. We will all be available to answer your questions.

Let me address first, however, one important aspect of the cleanup -- the funding.

Since July, 1981, the focus for efforts to provide cleanup funding has been the Plan proposed by Governor Thornburgh of Pennsylvania. Considerable progress has been made in obtaining many elements of the funding envisioned in that Plan.

The major element not yet in place and accordingly from which no funds have been supplied, is the U.S. electric utility industry portion. The Plan called for $190 million from the industry. The investor-owned utilities under the leadership of EEI have undertaken a voluntary effort to provide up to $150 million. These funds would start to flow to us once $100 million has been pledged. To date, about $83 million has been pledged by 41 of EEI's 126 members.

We, and the EEI leadership, are intensifying our efforts to obtain additional industry pledges. We know that others, including Governor Thornburgh, Chairman Palladino, and Secretary Hodel, have also been urging the industry to participate.

Many of the utilities which have not yet pledged have significant problems of their own. In some cases, this involves pressure or direction from the public utility commissions or from other state officials opposing participation. It is unfortunate that adverse political attitudes about nuclear power seem to be interfering with the self-interest of the nuclear plant owners in learning the many remaining lessons from the cleanup of TMI-2. The decision by the Japanese to participate is direct recognition of the value to industry of these lessons.

In addition to renewed efforts relative to the investor-owned utilities, we are seeking ways to obtain support from non-utility industries. In that regard, I should mention that Bechtel, our prime contractor on cleanup, has been working at TMI-2 at reduced rates, which to date represents a contribution of about $10 million. This is projected to increase to a total of about $20 million during the course of cleanup. While this arrangement was counted on in developing the $1 billion cleanup cost estimate, which is the basis for the Thornburgh Plan, it should be recognized as a real industry contribution.

The other element of the Thornburgh Plan where the funding has not yet reached the planned level is the Federal government R&D support. This was targeted in the Plan at $190 million. To date, DOE has budgeted a total of $159 million for R&D on TMI-2. Much of that total has been, and is to be, spent on R&D efforts related to TMI-2 but carried out off-site. That portion of the funds, while useful, was not reflected in the TMI-2 cleanup costs dealt with in the Thornburgh Plan and thus provides no funding for those costs. Up to about half of the identified DOE funding is now expected to be spent by the end of 1985 in ways that both constitute R&D and contribute directly to cleanup progress.

There is a great deal of R&D value in work to be done after 1985. Assistant Secretary Brewer's letter of April 17, 1984, to EEI states, "The DOE believes the cost benefit of R&D activities at TMI to be enormous." GPU believes that Federal R&D funding in later years is warranted and urges that DOE consider it. We suggest that such continued support be based on assuring completion of identified R&D efforts of national interest. We also believe that there is significant R&D value to NRC safety programs to be obtained from TMI-2. We understand that to date, the NRC has not devoted any of its R&D

funds to learning directly from the accident.

In order to increase momentum in the cleanup, GPU has just accelerated the work planned for 1984 by advancing $10 million. This, plus an additional $5 million in 1984 from the DOE and $3 million from the Japanese, gives us $93 million in 1984. This is 20 percent greater than the funding in 1983 and will allow us to proceed effectively toward removal of the fuel core.

The total funding required for 1985 is not yet assured. In fact, since our insurance funds will be exhausted in 1984, continued progress in 1985 requires that other funding sources be in place. We promise continued efforts to that end. In that regard, under existing rate-making orders, restart of TMI Unit 1 would increase funding of the cleanup by GPU's Pennsylvania customers to the full Thornburgh Plan level. It would also improve the financial condition of GPU, and permit us to consider advancing additional funds again in 1985.

Now, Mr. Clark will summarize our response to the requests in your May 11th invitation to this Hearing.

TESTIMONY
OF
PHILIP R. CLARK
PRESIDENT AND CHIEF EXECUTIVE OFFICER
GPU NUCLEAR CORPORATION

MADAM CHAIRMAN AND COMMITTEE MEMBERS:

I am pleased to be here to report to you on what has been done to strengthen GPU's nuclear activities in light of lessons learned from the accident five years ago and on the TMI-2 cleanup program.

ORGANIZATIONAL CHANGES

As Mr. Kuhns indicated, GPU's nuclear activities have been completely restructured and strengthened. Those changes were not the result of Congressional, NRC, or other mandats. They were the result of the Company's initiative to consolidate its nuclear capability and to enhance its effectiveness in dealing with the unique technical and operational aspects of its nuclear obligations. They are based on a careful review of the recommendations of the Kemeny and Rogovin reports, as well as our own studies.

We now have an integrated ogranization having full responsibility and authority for all aspects of nuclear activities, and no other responsibilities. Each of the power plants has a highly qualified director who is an officer of the company and is located at the site. These operating directors are supported by other divisions in each of the major disciplines — engineering, quality assurance, radiation control, maintenance and construction, administration and communications. These support divisions are headed by full-time directors reporting directly to the Office of the President.

In addition, we have provided for extensive cross checking and independent reviews to help ensure that all activities are carried out properly. An important part of this independent review is the activity of the Nuclear Safety Compliance Committee, a subcommittee of the Board of Directors, made up entirely of outside GPUN board members.

Today, GPU Nuclear has more than 2,600 personnel, of whom over 900 are applied full-time to operating and supporting TMI-1. Over 500 are degreed professionals with a total of more than 2,800 man-years of experience in nuclear activities. In comparision, Metropolitan Edison had only about 320 people applied to TMI-1 at the time of the accident.

The TMI Unit 2 organization brings together, under an integrated management, the necessary external capabilities in the form of the Bechtel Power Corporation as our major cleanup contractor.

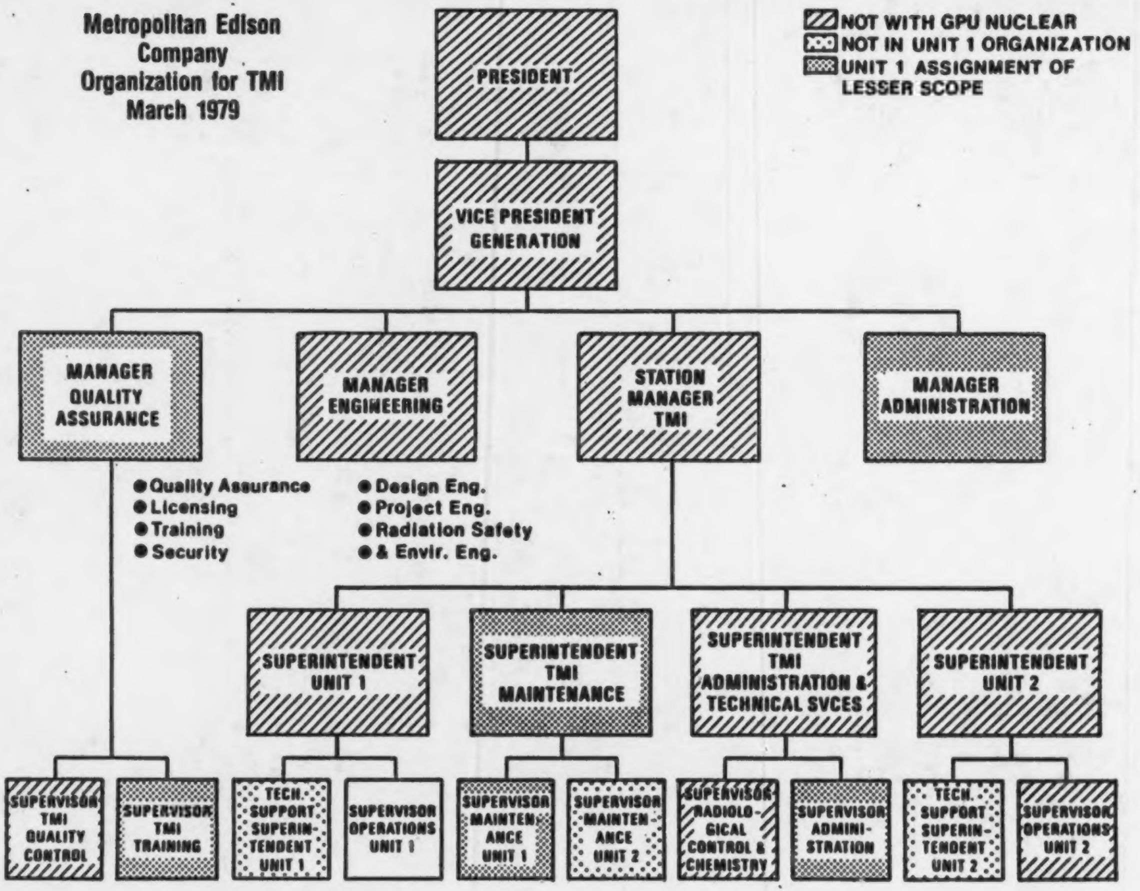
The changes in organization are graphically represented by charts one and two.

These charts show that the top four levels of management directly responsible for operating TMI before the accident are no longer involved in GPU's nuclear activities. In addition, both I, as President, and Mr. Kintner, as Executive Vice President of GPUN, plus seven of the 11 senior people reporting directly to us have joined GPU since the accident.

The GPU Nuclear Corporation represents new people, new talents, new management capabilities. We fully recognize that there is a tendency and perhaps even a desire on the part of some to identify the operation of Three Mile Island with that which went before. That is simply not so.

CHART 1

Metropolitan Edison
Company
Organization for TMI
March 1979


▨ NOT WITH GPU NUCLEAR
▨ NOT IN UNIT 1 ORGANIZATION
▨ UNIT 1 ASSIGNMENT OF LESSER SCOPE
PRESIDENT
VICE PRESIDENT GENERATION
MANAGER QUALITY ASSURANCE
● Quality Assurance
● Licensing
● Training
● Security
MANAGER ENGINEERING
● Design Eng.
● Project Eng.
● Radiation Safety
● & Envir. Eng.
STATION MANAGER TMI
MANAGER ADMINISTRATION
SUPERINTENDENT UNIT 1
SUPERINTENDENT TMI MAINTENANCE
SUPERINTENDENT TMI ADMINISTRATION & TECHNICAL SVCES
SUPERINTENDENT UNIT 2
SUPERVISOR TMI QUALITY CONTROL
SUPERVISOR TMI TRAINING
TECH. SUPPORT SUPERINTENDENT UNIT 1
SUPERVISOR OPERATIONS UNIT 1
SUPERVISOR MAINTENANCE UNIT 1
SUPERVISOR MAINTENANCE UNIT 2
SUPERVISOR RADIOLOGICAL CONTROL & CHEMISTRY
SUPERVISOR ADMINISTRATION
TECH. SUPPORT SUPERINTENDENT UNIT 2
SUPERVISOR OPERATIONS UNIT 2

PRESENT
GPU Nuclear Corporation
Organization
May 1984

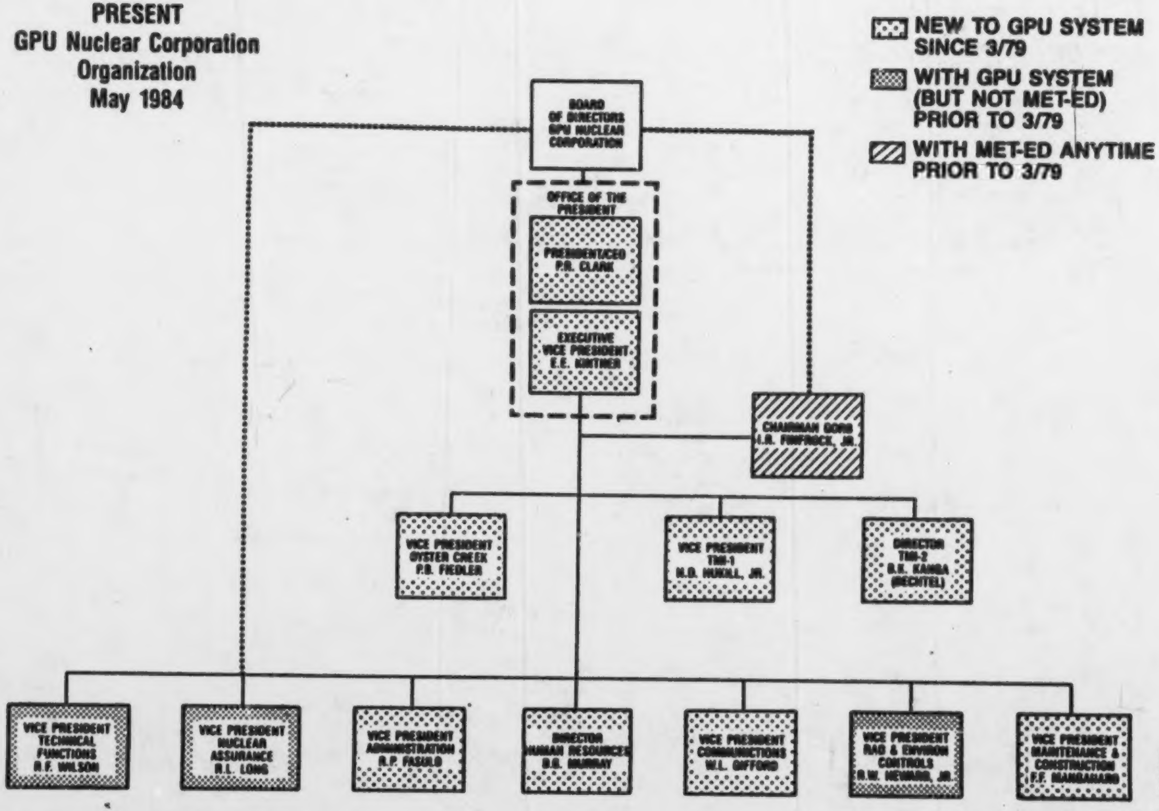

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CHART 2

TRAINING

Of equal importance to organizational structure and staff levels is the training of personnel. The TMI-2 accident greatly increased our attention and effort in the area of training.

One of the most important and visible training programs is that for licensed operators. Numerous changes have been made in their training. Some of these changes were mandated by the Nuclear Regulatory Commission in a letter dated March 28, 1980, further clarified in NUREG-0737. The changes include:

- A requirement for both RO and SRO license candidates to spend at least three months on shift as an extra person as part of their training program.
- A requirement for an SRO license candidate to hold a RO license for a year. (exceptions are prior experience at SRO level or a degree in engineering or related science)
- A change in the pass criteria on the license examination (was 70% overall with no sectional criteria, now is 80% overall and 70% on each section).
- Additional emphasis on heat transfer, fluid flow, and thermodynamics in licensing examinations.
- Technical qualification requirements were established for instructors of licensed operators (i.e., instructors who train licensed operators on plant systems, transients, integrated plant response or simulator, shall have demonstrated competence to the NRC by passing an SRO examination).
- Twenty-eight specified evolutions to be conducted at the plant or on a simulator as part of requalification program.
- Training in mitigating core damage.

GPU Nuclear Corporation has, of course, complied with the mandated changes. However, our efforts, many in cooperation with the rest of the industry, have gone well beyond that.

The Institute of Nuclear Power Operations (INPO), created in response to the TMI-2 accident, has had a significant effect on operator training. INPO guidelines have been used to evaluate, revise, and strengthen GPUN Operator Training Programs. GPUN has applied to INPO for accreditation of its Operator, Shift Technical Advisor, and Radiological Controls Technician training programs and the accreditation process is underway.

Classroom training for GPUN operators has approximately doubled in both the auxiliary/equipment operator and reactor operator replacement programs. Furthermore, the training is now tailored to the specific background and experience of the individuals.

We now provide instruction in reactor theory, heat transfer, fluid flow, and thermodynamics, not only to licensed personnel, but to the auxiliary/equipment operators as well.

In addition to improvements in operator training, our programs have been expanded to provide training to all technicians and technical staff personnel. At the time of the TMI-2 accident, the Oyster Creek and TMI Training Department had a total of approximately 15 people. Today, the GPUN Traning Department has an authorized staff of slightly over 100 people. In addition, the professional qualifications of the staff have been greatly increased.

Another major factor in assuring adquate training and one which represents a major commitment of resources is providing six full crews of personnel in operation, maintenance and radiation protection. This allows one shift to be available at all times to undergo training.

GPUN is continuing to review and improve its training programs. We have recently compiled and issued most portions of a new TMI-1 Operations Plant Manual as a improved integrated source of training information for instructors and students alike. The remaining sections of the manual, expected to total more than three thousand pages, are to be issued by this summer. A similar manual will be prepared for Oyster Creek.

The GPUN Training Systems Development Model, which was recently rated excellent by INPO and exceeds the requirements of the NRC model, will be used as the basis for development of all our training programs. It provides for more formal job task analysis to validate and refine our current programs, especially in the area of on-the-job training.

USE OF SIMULATORS IN TRAINING

The TMI-2 accident increased recognition of the importance of simulators in operator training. GPUN currently utilizes the B&W simulator in Lynchburg, Virginina, for training TMI-1 operators, and the GE simulator in Morris, Illinois, for Oyster Creek operators. We pay a great deal of attention to the effective use of these simulators. Preplanning meetings are held with B&W and GE prior to every simulator-training period. An experienced supervisor or foreman participates with each group of trainees. Each session is attended by a company representative who evaluates the effectiveness and provides for improvement in future sessions. Evaluations are made by the Vice President — Nuclear Assurance, Vice President for TMI-1 and the Director of Training and Education.

In addition to initial simulator training programs and periodic requalification for operators, specialized simulator-training programs have been conducted. The first of these was a two day program in the summer of 1979, which provided training on the TMI-2 accident itself. In June of 1983, TMI-1 operators spent three days training on newly developed procedures for responding to a steam generator tube rupture. In 1983, Oyster Creek operators completed a three-day session on improved Emergency Operating Procedures at the simulator.

Each crew of TMI-1 operators also completed a week of training in February of this year on an improved method of emergency response, called Abnormal Transient Operator Guidelines (ATOG). The ATOG philosophy is a "symptom-oriented" rather than "event-oriented" approach to responding to unanticipated plant transients. In anticipation of restart, each TMI-1 operating crew also recently completed three additional days of refresher training on the Lynchburg simulator.

GPU Nuclear recognizes the importance of having its own simulators for operator training. A Basic Principles Training Simulator (BPTS) for TMI was delivered in March 1984. The BPTS supplements classroom training by demonstrating the practical applications of basic principles of reactor theory, heat transfer, fluid flow and thermodynamics. In many ways, it is more effective in teaching principles and understanding than the more common replica simulator. An Oyster Creek BPTS is scheduled for delivery in late 1984.

Through the use of the BOTS, operators can analyse and diagnose abnormal plant conditions and monitor (in addition to all variables normally displayed) many calculated parameters -- e.g., fuel temperature, Xenon-reactivity, hydrogen generation. This greatly aids understanding.

GPU is one of the few utilities to provide Basic Principle simulators.

GPU has also ordered a full-scope replica simulator which duplicates the control room of TMI-1. This devide is scheduled for installation at the TMI Training Center in December, 1985, at a cost of $15,000,000.

Both the replica simulator and the BPTSs have computer assisted exercise capabilities which permit accurate assessment of operator performance. All of the simulator training activities emphasize the importance of the team concept and effective communications among personnel when controlling normal plant operations and responding to accidents.

TMI-2 RECOVERY PROGRESS

The recovery of TMI-2 has progressed to the point of direct work on the reactor vessel itself in preparation for removing the damaged fuel core. Removing the damaged reactor fuel is the most significant remaining step in the entire effort. It will substantially reduce the remining risk to the public.

To get to this point, GPU Nuclear and its contractors first had to contend with two unprecedented problems: processing and storing more than one million gallons of highly radioactive water from the basements of the auxiliary and reactor containment buildings, and then reducing radiation levels in the containment building to provide practical access to the reactor.

The water purification problem was attacked first, since the presence of radioactive water in areas not designed for water storage represented the most significant immediate threat to public health and safety. That water has been cleaned up. The more than 400,000 curies of radiation it contained have been safely collected. The processed water is being stored on Three Mile Island and is being recycled and used during the cleanup.

A major step in meeting our commitment to the public around TMI — that the Island would not become a disposal site for accident-related wastes — was taken in August of last year, when the last of the ion-exchange resins on which the radioactivity from the containment building's basement water had been captured, was shipped to a U.S. Department of Energy laboratory in Richland, Washington.

Once the accident water cleanup program was well started, efforts began to reduce radiation levels in the containment building to reduce worker exposure and allow practical access to the containment and the reactor itself. The first major step toward reducing radiation levels in the containment building and permitting manned entries into the building, occurred in the Summer of 1980 with the venting of about 44,000 curies of Krypton-85, an inert radioactive gas. This was accomplished safely, with no consequential health effects.

A series of decontamination experiments, funded in part by the Department of Energy, began in late 1981. A variety of decontamination techniques, including the use of water sprays and strippable coatings, initially reduced contamination levels substantially on surfaces in the containment building. However, these techniques did not reduce area radiation levels as much as had been hoped. They were hampered by recontamination, a result of forced air circulation in the building.

Accordingly, in early 1983, the emphasis was shifted from general decontamination and cleaning of the building to reducing the effects of specific sources of radiation, primarily through the use of shielding in the form of lead blankets, bricks and water columns placed around or over key sources of radiation. These shielding techniques reduced general area radiation dose rates by about 50 percent. A new dose reduction effort is now underway with the intent of further reducing by half radiaton levels in areas where defueling work will take place.

The first significant steps toward removing damaged fuel from the reactor vessel were taken in the Summer of 1982 with three "Quick Look" inspections of the reactor's damaged fuel core by a miniature television camera inserted through control rod-guidetube openings in the reactor's head.

These inspections provided the first direct evidence of the condition of the core. Videotapes have now been made of areas of the reactor, samples of debris from the core have been removed and a sonar-assisted, three-dimensional model of the core void — the area of maximum core damage — have been prepared.

Major portions of these activities have been funded by the Department of Energy. Let me say at this point that, overall, both the Department of Energy and the Nuclear Regulatory Commission have attempted to be constructive while still fully discharging their own responsibilities relative to TMI-2.

At this point, the defueling program is in the final stages of preparations for removing the reactor vessel head, now scheduled for early August. The stud bolts holding the head to the reactor vessel have been loosened slightly in preparation for removal.

Preparations for defueling the reactor were dramatically slowed by allegations made in late March, 1983, by three TMI-2 employees. They involved primarily the procedures associated with refurbishing the polar crane required to lift the reactor vessel head. Investigations of the safety allegations by both NRC and GPUN indicated procedural problems existed but that they had little or no safety significance. These problems have been corrected. Most importantly, no work has been done unsafely.

While it is hard to be precise, those allegations, the extensive investigations by the NRC and GPU Nuclear, and the resulting effect on the organization and people were the major contributors to a schedule slippage of a year. The polar crane load test was originally scheduled for the first quarter of 1983. It was completed without difficulty in March of this year.

For the past few months, a Task Force has been re-examining what is now known about the damaged core and the possible defueling methods, and preparing a program plan aimed at accelerating work so as to regain, if possible, half of the lost year in the schedule before commencing removal of the core, and attempt to regain the remainder of the time lost before core removal is completed. To that end, GPU has advanced an additional $10 million of funding in 1984 and the DOE and Japanese industry are providing another $8 million, bringing the total available for 1984 to $93 million.

Development of the plan for defueling is an excellent example of the extent to which work at TMI-2 is truly research and development. We now have a reasonable picture of the upper surface of the core; however, we do not know the condition of the reactor core over most of its volume. We believe that some of the fuel is not within the previous core volume but is now located elsewhere in the reactor vessel or connecting systems. Therefore, we must plan each step, learn from each step, and be prepared to modify our plans as new information is obtained.

As a result of the significant decay of radioactivity with time and the removal of the majority of the radioactivity which had been distributed throughout the plant by the accident, the risks to the public from TMI-2 have been greatly reduced. TMI-2 operated at a pressure of more than 2,200 PSI, at a temperature of 600 degrees Fahrenheit and generated more than 2,500,000 kw of heat. It is now at ambient pressure and a temperature of 82 degrees Fahrenheit, and the total heat being generated is only 17 kw — equal to about 15 household toasters. The reactor now requres no external cooling, because it keeps itself at this temperature by natural loss of heat to its surroundings. There is now insufficient remaining energy to expel radioactivity from the reactor proper in such a way as to test the containment building integrity or threaten to release significant radioactivity to surroundings.

The Safety Advisory Board, a group of nationally known experts in a broad spectrum of disciplines established to provide an overview of TMI-2 safety, has confirmed in a recent statement that the risk to the public has been dramatically reduced.

The TMI-2 accident, however unfortunate, created a great and unprecedented opportunity to acquire information on nuclear technology in ways which could not have been made available through normal research and development programs. Data is available at TMI-2 which can affect plant system designs, provide insights into accident mitigation, modify licensing criteria and confirm analytical models of reactor accidents. Although there is new and important information to be gained in almost every area of nuclear engineering, one of the most important is in the definintion of the "source term," that is, the transport of radioactive fission products from a damaged core to the environment. This source term, which is the basis for many of the criteria, is applied to reactor safety decisions. Learning about the source term is part of DOE's TMI-2 efforts.

Additional important learning is also now taking place in the development of decontamination and radioactive waste processes such as that for removal of the radioactivity from the basement water. And of course, much is being learned about how best to protect those who must work in radioactive environments while enabling them to work effectively.

This learning process which the recovery from the TMI-2 accident represents, is one in which more than just GPU Nuclear is participating. The organization at the site is an integrated group of GPU Nuclear and Bechtel personnel. The Electric Power Research Institute (EPRI), founded by the utilities, is sponsoring R&D activities at the TMI-2 site. In addition, major specific tasks have been assigned to other nuclear industry companies.

There are many opportunities for additional participation by other members of the U.S. and foreign-nuclear industry. Japan has an active nuclear program with an installed capacity about one-third that of the U.S. In addition to its financial contribution, the Japanese nuclear industry is assigning more than twenty engineers to TMI-2 and U.S. laboratories to participate in the research-and-development activities of the recovery operation. Nine of these engineers will report to the TMI-2 site this summer. They will be working alongside our own personel in carrying out the remainder of the cleanup. The Japanese nuclear industry has thus recognized in a very meaningful way the benefit of participating directly in the TMI-2 recovery program.

In summary:

a) The majority of the radioactivity dispersed through the plant buildings by the TMI-2 accident has been collected and shipped off site.

b) The damaged reactor is shutdown, quiescent, and self-cooling with no significant source of energy to cause further release of radioactivity. Thus, risks to the public have been significantly reduced.

c) Steps are being taken to expedite removal of the damaged reactor core and move the cleanup back toward the schedule in place before the "whistle blowing" incidents of 1983.

What is needed now is assurance of continued funding to carry out the program.

RECOMMENDATIONS

In response to your specific request, GPU has several recommendations to make to the Subcommittee. They are not new in the sense of suggesting specific actions in areas where the Committee has not been active. Rather, they suggest continued and perhaps intensified efforts in areas in which you have already been active. Nonetheless, today's circumstances are somewhat different than those in the past. It is now five years since the TMI-2 accident. A decision by the NRC on restart of the undamaged Unit 1 seems to be finally at hand. Restart is a key step in assuring that GPU remains strong enough financially to carry out cleanup in a timely way. Assured funding for the cleanup of TMI-2 seems attainable but needs a major final effort.

In that light, we recommend that the Subcommittee should, within its purview, continue to actively encourage and support:

1. NRC's efforts to reach a timely decision on restart of TMI-1 on its own merits independent of other issues.
2. Continued Federal funding sufficient to complete the identified R&D tasks and fully capitalize on the significant learnings from TMI-2 which are of national interest.
3. Completion of an overall program providing assured funding for cleanup.
4. Continued appraisal of NRC regulations and criteria applied to TMI-2 cleanup to assure they are appropriate for the unusual physical conditions of TMI-2 and recognize the contribution that timely completion of the cleanup will make to public safety.

We appreciate this opportunity to appear before the Committee, and we will be happy to respond to any questions you have.

PHILIP R. CLARK, SR.

Philip R. Clark Sr. is President and Chief Executive Officer of GPU Nuclear Corporation. GPU Nuclear operates the nuclear power stations at Three Mile Island and Oyster Creek, New Jersey.

He had served as GPU Nuclear executive vice president since January 1982 and as vice president for nuclear activities for the former GPU Nuclear Group from late 1979 to January 1982. GPU Nuclear Group was a corporate predecessor of GPU Nuclear Corporation.

Before retiring as a U.S. government employee in August 1979, Clark worked as associate director, reactors, Naval Reactor Division, U.S. Department of Energy, and as chief, Reactor Engineering Division, Nuclear Power Directorate, Naval Sea Systems Command, Department of the Navy. In these positions, Clark directed a major element of the U.S. Naval Nuclear Propulsion Program.

Clark received a bachelor's degree in civil engineering in 1951 from Polytechnic Institute of Brooklyn, where he did graduate study in 1951-53. He attended Oak Ridge School of Reactor Technology in 1953-54.

Clark received a Navy Distinguished Civilian Service Award in 1972 and the U.S. Energy Research and Development Administration Special Achievement Award in 1976.

Edwin E. Kintner
GPU Nuclear Corporation

Present Position:

Executive Vice President, GPU Nuclear, effective November 1983.

Assist CEO in managing the operations of GPU Nuclear, a nuclear utility company. Primary areas of responsibilities are TMI-2 Plant division, and Administration, Nuclear Assurance and Radiological & Environmental Controls support divisions.

Previous Positions:

Vice President & Director Administration, GPU Nuclear June 1983 to November 1983.

Primary areas of responsibility included Fiscal & Information Management, Materials Management and Security, Facilities and Industrual Safety & Health.

Assistant to Vice President of TITAN Industries, involved in energy and defense research projects for Government, 1982 to May 1983.

Associate Director For U.S. Magnetic Fusion Program, Department of Energy, from 1977 to 1982. Deputy Director of the Fusion Program from 1[illegible]6 to 1977. From 1966-1976, Atomic Energy Commission, serving as chief c[illegible]el procurement, assistant director for reactor engineering, deputy d[illegible]tor of reactor development.

U.S. [illegible]avy, served as project officer of the U.S. Nautilus, first nuc[illegible]-powered ship, holding positions of increasing responsibility during 21 year naval career. Retired in 1963 with the rank of captain.

Education:

U.S. Naval Academy, B.S.

Massachusetts Institute of Technology, M.S. Naval Architecture and Marine Engineering.

Massachusetts Instutute of Technology, M.S. in Nuclear Physics and Engineering.

Professional Memberships

EPRI Nuclear Power Divisional Committee.

Awards:

MIT Distinguished Alumnus Award.
Navy Commendation Medal.

Appointments:

Chairman of U.S. Side of U.S./USSR Joint Fusion Power Committee.
U.S. Representative to International Fusion Research Council.
Chairman of U.S.Side of U.S./Japan Fusion Power Committee.
Chairman of U.S. Fusion Power Coordinating Committee.

PETER B. FIEDLER

Peter B. Fiedler is Vice President and Director of the Oyster Creek Nuclear Generating Station.

He had served as head of the U.S. Navy Fleet Modernization Program headquartered in Washington.

He served in the U.S. Navy for more than 28 years and has extensive experience in the Nuclear Surface Ship Program.

A 1954 graduate of the U.S. Naval Academy, he holds a bachelor of science degree in naval science and earned a master's degree in physics from the Naval Post Graduate School, Monteray, California. He served aboard the U.S.S. Enterprise as Reactor Officer and with the U.S.S. Longbeach as Chief Engineer. He was commanding officer of the USS Lawrence and completed his sea duty as Commanding Officer of the USS Texas, a nuclear guided missile ship, during construction, commissioning and shakedown.

HENRY D. HUKILL

Henry D. Hukill is Vice President and Director of TMI's Unit 1.

In this position he is responsible for the day-to-day operation of Unit 1 in a safe and efficient manner.

After serving as a senior civilian special assistant to the commander, Naval Sea Systems Command, Hukill joined GPU Nuclear in June 1980, bringing more than 20 years experience in the nuclear power field.

A native of South Bend, Indiana, he received a bachelor of science degree from the U.S. Naval Academy in 1953. Following graduation he served 22 years with the Navy, where he was primarily involved with the construction, maintenance and operation of nuclear submarines. He also completed one year of naval nuclear power training. His Navy assignments included five years as a Commanding Officer of Nuclear Submarines and four years on the staff of Admiral Richover with responsibility for the selection and engineering training of all nuclear ship commanding officers.

From 1976 to 1977 he was associated with the Clinch River Breeder project for Burns and Roe, Inc.

RICHARD F. WILSON

Richard F. Wilson is Vice President and Director of Technical Functions and has more than 25 years experience in the nuclear power field.

In this capacity he has the responsibility for the engineering, design, licensing and technical support of all nuclear generating stations in the GPU Nuclear System.

He joined the GPU Service Corporation in 1975 as Manager of Quality Assurance. He previously held positions at Offshore Power Systems and the Atomic International Division of North American Rockwell.

Following the March 1979 accident, he served as Acting Director TMI Unit 2.

Wilson earned a bachelor of science degree in mechanical engineering from the University of California at Berkely in 1951 and a master's degree from the University of Michigan in 1953. He also completed a one year program in Nuclear Engineering and Reactor Technology at the Oak Ridge School of Reactor Technology.

ROBERT L. LONG

Dr. Robert L. Long is Vice President and Director of Nuclear Assurance for the GPU Nuclear Corporation. In June 1978 he was Professor and Chairman of the Chemical Nuclear Engineering Department at the University of New Mexico. He holds a B.S. degree in Electrical Engineering from Bucknell University and a M.S.E. and Ph.D degree in Nuclear Engineering from Purdue University. He has extensive reactor operations experience from work at Argonne National Laboratory, White Sands Missile Range, Sandia Laboratories, University of New Mexico, Atomic Weapons Research Establishment in England, and Indian Point Nuclear Station. He has numerous publications and has presented lectures on energy and the environment issues all over the United States and in Southeast Asia.

ROBERT P. FASULO

Robert P. Fasulo is Vice President and Director of Administration of GPU Nuclear Corporation.

Mr. Fasulo, whose appointment was effective February 6, 1984, served from 1973-84 as deputy manager of the U.S. Department of Energy's Richland (Washington) Operations Office. In that position, he was involved in the management of the production and disposal of nuclear materials. His career also has included management positions during an eight-year tenure with the U.S. Naval Reactors Program.

He is a graduate of the U.S. Naval Academy and has done graduate work at Notre Dame, Loyola of Chicago and in Department of Energy executive courses.

Mr. Fasulo reports directly to the GPU Nuclear Office of the President.

WILLIAM L. GIFFORD

William L. Gifford is Vice President and Director of Communications.

In his role he is responsible for external and internal communications including media relations, employee relations, public affairs and graphics.

He is a veteran of more than 20 years experience in public affairs and legislative relations in Washington, including service at the White House, Congress and the Treasury and Labor departments. He has also been associated with the General Electric Company.

Prior to joining GPU Nuclear in November 1980 Gifford worked briefly as a Washington consultant to the Bechtel Corp., an international engineering firm.

During the transition period between the Carter and Reagan administrations, Gifford served on the advisory committee to the Treasury Department directing the transition team.

A native of Fairfield County, Connecticut, Gifford holds a degree in journalism and philosophy from Fordham University. He has written numerous magazine articles as well as a syndicated column of satire.

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RICHARD W. HEWARD

Richard W. Heward is Vice President and Director of Radiation and Environmental Controls.

He is responsible for developing and implementing programs for radiation control and environmental aspects at all GPU Nuclear sites.

Joining GPU in 1967, he has held several project management positions, including heading TMI and Forked River Nuclear Station projects during their design and construction phases.

He also served as safety and licensing manager for GPU.

Before joining the utility, Heward served as supervisor of reactor engineering and chief naval nuclear engineer for the New York Shipbuilding Corporation and was previously affiliated with the Philadelphia Naval Shipyard.

Heward received a bachelor of science degree from Swarthmore College in 1957 and earned certificates from the Oak Ridge School of Reactor Technology and the Harwill Reactor Safety Course.

FRANCIS F. MANGANARO

Francis F. Manganaro is Vice President and Director of Maintenance and Construction.

His responsibilities include performance of maintenance and construction activities at all nuclear power plants as well as development and coordination of policies and practices for all routine power plant maintenance.

Manganaro comes to GPU Nuclear with 33 years of Navy service, 21 of which were associated with nuclear power.

He joined GPU in July 1980 following his retirement as a rear admiral in the Navy. His last naval assignment was that of Vice Commander, Naval Seas Systems Command.

After receiving his bachelor of science degree in electrical engineering from the U.S. Naval Academy in 1947, he furthered his education at the Massachusetts Institute of Technology, University of Minnesota and Harvard University.

IVAN R. FINFROCK, JR.

Ivan R. Finfrock, Jr., is Chairman of the General Office Review Board, (GORB) and reports directly to the President and Chief Operating Officer of GPU Nuclear.

GORB consists of senior GPU personnel and outside experts and consultants who provide independent review of potentially significant nuclear and radiation safety matters at all three GPU Nuclear plants.

Finfrock has more than 25 years experience with the GPU System.

Holding a bachelor of science degree in electrical engineering from the Institute of Technology (now Drexel University), Finfrock also studied at Pennsylvania State University, Graduate Service, Reading, and at the International School of Nuclear Science and Engineering at Argonne Laboratories.

After serving two years in the U.S. Army Corps of Engineers, Finfrock joined Met-Ed in 1954 as a cadet electrical engineer.

In 1959 he was assigned to the Saxton Nuclear Experimental Corp., where he became supervisor of reactor plant services before becoming nuclear project engineer for the Oyster Creek Project in 1964.

Finfrock held several positions at the Oyster Creek station before being named Vice President of Generation for JCP&L in 1972.

Mrs. LLOYD. Thank you very much for being here today. It's good to see you, and it's good to see my good friend, Ed Kintner, back with us, too.

In reviewing this process, it seems to be taking an awfully long time. What part of the delay do you feel is due to the lack of funding and what part—what can be divided out as technical or regulatory problems? Where are we going to put most of the blame for this?

Mr. KUHNS. You're talking about the cleanup?

Mrs. LLOYD. That's correct.

Mr. KUHNS. You're talking about the cleanup rather than the restart of unit 1?

Mrs. LLOYD. No, no, we're talking about the delay of the cleanup.

Mr. CLARK. I don't think you really can, Madam Chairman, separate out those three elements. They all have been going on contemporaneously and simultaneously. I think each of them has played a significant role. The fund has been a limit. I think there have been technical difficulties.

I think the whistle-blowing, the allegations that I referred to last year, clearly had a major impact, and I think that there is an inherent difficulty—and this is what's spoken to in my fourth recommendation—in applying to the unique situation of TMI-2 regulations which were developed and in place for operating reactor plants. And I think we've been trying to deal with that and see how they might justifiably be revised and making proposals to the NRC. I think that's a regulatory area that we and they have to continue to work in.

Mrs. LLOYD. How much is a factor of unit restarting of unit 1 in funding for the cleanup?

Mr. KUHNS. Based on unit 1 in regard to the cleanup?

Mrs. LLOYD. Yes.

Mr. KUHNS. Based on the ratemaking decision in early 1983 by the Pennsylvania commission, and as further revised by some subsequent actions—at that point, I may go back. They conditioned the availability of customer-provided cleanup dollars on the restart of unit 1. That was then modified somewhat to the point where that, once TMI-1 restarts and meets a standard of 35 percent power level for 100 consecutive hours, it goes into rate base. And, in addition, immediately available becomes $15 million of remaining customer funding a la the Thornburgh plan.

Mrs. LLOYD. Your company was on the verge of bankruptcy a few years ago. Are things a little bit better now?

Mr. KUHNS. They had only one way to go, and that's—that's correct they are a little better.

Mrs. LLOYD. Well, do you feel that you're out of danger?

Mr. KUHNS. No, we don't feel we're out of danger. We feel we're rather stable at the moment in terms of our ability to live within our cash, our internal cash generation. We are still without any access to capital markets. Our only access to outside cash is the revolving credit agreement with the banks that we negotiated in 1979 and have recently extended into 1985. But we are very much cash constrained and are having, as I say, to live within our cash limitations. Indeed, the restart——

Mrs. LLOYD. When you've managed, maybe you'll come back and tell the Congress.

Mr. KUHNS. I'm sorry?

Mrs. LLOYD. Maybe when you get this behind you, maybe you'll come back and give us some advice for the Congress. [Laughter.]

Mr. KUHNS. Well, we have identified for our stockholders recently at the annual meeting a couple of weeks ago that there are two significant events that must occur before we can really begin to feel that we have regained some financial health, health to be recognized. The first is the restart of unit 1, and the second is to get a more assured funding plan for the cleanup of 2, and that means specifically to have the utility industry share available. We feel at that point that we will have access to capital markets and will be more like a normal utility than we have been certainly for the past 5 years.

Mrs. LLOYD. Some people are advocating bankruptcy as the way to go for utilities that are facing financial problems. Would you care to comment on that, Mr. Kuhns?

Mr. KUHNS. Well, some advocated that in our case, of course, and we were subject to several investigations of that subject in New Jersey and in Pennsylvania. The U.S. General Accounting Office examined it. The SEC staff commented on it, and everyone came out with the conclusion that bankruptcy serves no one's interest—not the customer, not the investor.

Utilities are capital-intensive. They have to normally—we're not able to now but they normally have to—access those markets and raise capital. You're just not going to be able to do that if a bankruptcy is tolerated, I believe, without enormous cost to the—the investor will demand enormous returns and they will have to be provided by the customer. So it's a no-win situation for both the customers and the investors, and it should not be recognized as an option——

Mrs. LLOYD. It certainly erodes the confidence in utilities as well.

Mr. KUHNS. Well, it certainly does.

We are seeing more comments recently, and you mentioned some of these other utilities that are facing enormous financial difficulties with numbers that stagger even us in terms of the cost of some of these plants.

TMI-1 is on our books at $460 million, and, you know, that's the biggest bargain the customers could have. We're talking in other parts of the country with plants costing several billion dollars, and some are suggesting, well, isn't this a time to take a look and maybe wipe out the stockholders and turn the plants over to the customers or to the employees. It just won't work in my judgment.

Mrs. LLOYD. Well, too, I think that when your house is in order that, although your nuclear plants have a front-end intensive cost, that you're going to have a source of power that will be more than competitive as well.

Mr. KUHNS. You're absolutely right. If we had to replace TMI with a coal plant, let's say, today, we would be looking at costs to the customer of something in excess of 10 cents per kilowatt-hour. TMI-1 comes back in service and the customer will pay—will be paying something less than 4 cents per kilowatt-hour. So the economics are just——

Mrs. LLOYD. That's so often overlooked. It's not really a subject of this hearing, but I think it's so often overlooked that, although there is an enormous front-end cost for the nuclear plants, in the long run you have a much cheaper source of power because the cost of fuel is certainly less.

Thank you very much.

Mr. Walker.

Mr. WALKER. Thank you, Madam Chairman.

In your testimony, Mr. Clark, you mentioned the Safety Advisory Board. Can you give us a little more information about the purpose of that board and what kind of staffing, and so on, that you've provided on that?

Mr. CLARK. Yes, sir. That was set up about 3 years ago by the company as an attempt to draw on the most knowledgeable people in the entire country in all the aspects of the cleanup and to have available to us that expertise with the focus on the safety aspects of the cleanup and the secondary focus on our efforts—looking at our efforts to keep the public informed.

The chairman of that board since the very beginning is Dr. James C. Fletcher. I think some of you will remember Dr. Fletcher as the head of NASA, now with the University of Pittsburgh. Serving with him: Dr. John Auxler from Oak Ridge National Laboratory; Dr. Merril Eisenbud, who was with NYU, I believe is now fully retired; Dr. Jacob I. Fabrikant of the University of California; Dr. Robert S. Friedman of the University of Pennsylvania; Dr. Bruce Lundin of NASA, now with UCLA; Dr. Howard Raiffa of Harvard—I'm quite sure he's from Harvard; Lombard Squires; Dr. William R. Stratton of Los Alamos; and Prof. Norman Rasmussen of

MIT. So we have a very distinguished group of people. They have been very helpful to us over the last several years and are continuing to be so.

Mr. **Walker**. We have a vote on, and so I'm going to—we're going to go vote now and come back, and then I'll finish up my questioning at that point.

Mrs. **Lloyd**. We will be in recess for about 15 minutes.

[Recess.]

Mrs. **Lloyd**. The committee will resume its hearings.

I want to again apologize for these unavoidable delays.

Mr. Walker.

Mr. **Walker**. We are—based upon the vote when we left, we are going to plunge the Federal Government into bankruptcy here pretty quickly, I think. We will join you in all kinds of fiscal problems here, I think, about the time this vote gets finished over there.

I think it becomes apparent from some of the statements I've made and some of the questions I've raised in the course of the hearing today that I think the major problem to be addressed is the funding issue, and primarily the funding issue as it relates to getting the cleanup finished on schedule.

As you know, I've attempted to convince the Department of Energy to work with OMB to redefine the Federal commitment to account for inflation so that additional funds can be made available through that route. You also know that, as far as I'm concerned, the Nuclear Regulatory Commission ought to make a commitment to spend some of their R&D funds to study the core since results of that study would have wide regulatory applications. And, as you may have gathered from my opening remarks, I believe the boycott of this hearing by EEI is totally irresponsible. And I can assure you that any industry witness before this committee in the future will undoubtedly have an opportunity to hear my views on precisely that.

And I would suggest that if EEI is going to be so contemptuous of this committee and is so willing to refuse to cooperate with us, then some members of this committee may find that our funding priorities may need some kind of adjustment in the future.

Let me ask you this, and I don't know whether this is available to you or not: can you provide us with any kind of schedule of the pledges that have been made thus far under the EEI? Do you have any access to that information, and who has made the pledge, and what amounts they have made, and so on?

Mr. **Kuhns**. Yes. Yes, Mr. Walker, we do have that information. We'd be happy to provide it to the committee.

Mr. **Walker**. I would very much appreciate if that information can be made available to the committee for our records. I think it would help us provide some focus, too, and it would certainly help us when we have witnesses before the committee to figure out who's been helping and who hasn't.

[Material to be supplied follows:]

Status as of: May 31, 1984

Voluntary Program

TMI Cleanup

WILL PARTICIPATE

No. of Systems: 43

	Amount**
Southern Indiana Gas & Electric Company	$ 23,290
Iowa Public Service Company	23,249
*Delmarva Power & Light Company	92,249
Minnesota Power Company	55,346
Indianapolis Power & Light Company	67,851
*Cleveland Electric Illuminating Company	330,043
*El Paso Electric Company	107,402
*Public Service Electric & Gas Company	625,094
*Philadelphia Electric Company	755,831
Eastern Utilities Association	55,298
Newport Electric Corporation	2,995
*Union Electric Company	331,906
Orange & Rockland Utilities, Inc.	6,635[2]
*Public Service Company of Colorado	157,161
*Duquesne Light Company	223,504
Northwestern Public Service Company	5,486
Montana-Dakota Utilities Company	12,739
*Pennsylvania Power & Light Company	432,009
Iowa Power & Light Company	32,263
*Northern States Power Company	389,911
*Atlantic City Electric Company	95,899
*Detroit Edison Company	375,391
*New England Electric System	220,364
*General Public Utilities Corporation	439,570
*Carolina Power & Light Company	630,141[1]
*Duke Power Company	1,115,828[1]
*Consumers Power Company	498,075
*Texas Utilities Company	702,728
*Alabama Power Company	458,392***
*Georgia Power Company	554,279***
*Virginia Electric & Power Company	724,254
*Northeast Utilities	529,300****[2]
*Baltimore Gas & Electric Company	368,913
*San Diego Gas & Electric Company	151,010
*Public Service Company of New Hampshire	163,735[1]
*American Electric Power Company, Inc.	864,757[2]
*Louisiana Power & Light Company	330,541[2]
New Orleans Public Service Company	37,863
*Middle South Energy, Inc.	310,050[2]
Mississippi Power & Light Company	58,002
*Arkansas Power & Light Company	349,358[2]
*Central Power & Light Company	187,762
*Toledo Edison Company	202,060[2]
Total to Date	$ 13,088,634

*Company with nuclear power programs.
**Yearly contribution
***Estimate, part of Southern Company
****NEU pledge contingent on aggregate commitment of $112.5 million.
1 See Footnote 1 on attachment.
2 See Footnote 2 on attachment.

Status as of: May 31, 1984

Voluntary Program

TMI Cleanup

WILL NOT PARTICIPATE

No. of Systems: 15

	Amount**
St. Joseph Light & Power Company	$ 7,884
Sierra Pacific Power Company	24,790
*Gulf States Utilities	405,760
Exeter & Hampton Electric Company	2,347
*Illinois Power Company	332,673
Edison Sault Electric Company	2,666
*Pacific Power & Light Company	165,559
Concord Electric Company	2,274
Black Hills Power & Light Company	7,466
*United Illuminating Company	117,457
Empire District Electric Company	15,086
*Kansas City Power & Light Company	127,809
Washington Water Power Company	59,396
Iowa Southern Utilities Company	11,725
*New York State Electric & Gas Company	112,619

Total to Date $ 1,395,511

*Company with nuclear power programs.
**Yearly contribution.

Mr. Walker. Can you also tell us whether or not the pledges have increased since the period of time that the Internal Revenue made the ruling that we all were told was so vital to getting the industry onboard?

Mr. Kuhns. Mr. Cherry may have those numbers. I do not. There have been significant——

Mr. Cherry. Yes.

Mr. Kuhns [continuing]. Moves in that direction.

Mr. Cherry. Congressman, the Internal Revenue Service ruling was received about the end of last year. At that point the EEI program pledges stood at about $65 million. Since then, we've received about $18 million in additional pledges. And, in addition to that, as was earlier indicated, the New York utilities petitioned the New York Public Service Commission and, would that petition have been approved, that would have added another about $6 million to the total, but, as indicated, that petition was denied. So there was that action following the receipt of the IRS ruling.

Mr. Walker. That's the petition I referred to that also relates to West Valley; that New York's down here telling us that we ought to come up with all the money for West Valley, yet they're supposed to have a share of it, but we get that kind of a reaction with regard to a problem that also has national implications in Pennsylvania. That really does give me some concern. I thank you for that.

Do you have any idea as to how we might convince the industry to start making more in the way of pledges?

Mr. Kuhns. I think it's—let me say that I've been a member of this industry for 35 years now, I think, something like that, and I've always been proud of the industry's ability to provide electric service, just great reliability at a good cost. This is not their finest hour.

They are, of course, dealing with a lot of other problems. The industry is not in good overall shape, and they see their own local problems, understandably I guess, more clearly than they do this.

We know—I know—in talking to them and going to the meetings that they very definitely see the R&D value here, and they are anxious to be a part of it. And many of them who are not a part of it today really want to be there. You can go State by State, and there are some States that have taken very negative positions on this, California being one. We do have one large California company in; the other two are not. It is a commission-related problem there in terms of their own activities to gain licenses for their nuclear plants. And we're dealing with political issues to a great extent, and this involved.

So I would say that we are hopeful they're going to make it or, if they don't make it, they'll find an alternative route to provide the equivalent dollars. I know there is a commitment to that by the leadership of the industry. Mr. Dougherty, the chairman of the EEI at this point, to whom you sent your invitation, has tried very hard and I wouldn't want you to interpret their absence here today as turning their back on this committee or turning their back on the funding program.

We'll just keep at it, and we are working very hard. We've gotten great help from the Pennsylvania electric utilities and the New

Jersey electric utilities, who are very strongly behind this and pushing very hard.

Mr. Farley, Joe Farley, assumed the chairmanship of the EEI funding committee on this project, and Joe has worked very hard.

It's not neglect in that sense. It's taken much too long, and I think they're as embarrassed as they should be.

Mr. **Walker**. With regard to the restart issue, I think it's apparent that some people have a hard time putting together the restart of unit No. 1 with the rather complex public health and safety issues that surround the cleanup of unit No. 2.

And it has, I think, been somewhat misunderstood in fact that there is a direct tie between those two, because virtually everyone's cleanup formula has included revenues derived from the cleanup of unit No. 1. I know of no one's plan that came forth with any kind of cleanup scenario that did not involve unit No. 1 generating revenues.

Let me ask you about the consequences of either restart or a failure to restart in several ways.

First, can you tell us the cost to the consumers for purchase of replacement power when unit 1 is not operating?

Mr. **Kuhns**. Well, when unit 1 comes back into service, the customers' energy bill in both Pennsylvania and New Jersey will decrease by $177 million on an annual basis. That's just energy. Now that's going to be offset by the base rate increase to the extent of about $98 million. So that, when you look at both, the base rate increase more than offset by energy cost decrease, the customers will receive a rate reduction of about $80 million, $65 million of which is in Pennsylvania.

So the direct answer to your question is the energy costs go down by about $177 million.

Mr. **Walker**. Well, which—about $80 million of that accrues directly to the benefit of the consumers?

Mr. **Kuhns**. That's correct. That's correct.

Mr. **Walker**. Second, can you tell us what the cost would be to the consumers if you do not get permission to restart unit 1 and have to build a coal-fired plant? I think you went into that before——

Mr. **Kuhns**. We got into that a little bit with the chairman earlier, but, just to repeat, we estimate that if we replaced TMI–1 with a coal plant, based on an updating of those costs, assuming about $2,000 to $2,500 a kilowatt, which we think is conservative, it does involve scrubbers, it involves a pretty good capacity factor, and a fixed charge rate that's conservative, we would end up with the customers' cost of energy from that plant at about a minimum of 10 cents per kilowatt-hour.

TMI–1, when it returns to service, will be providing energy at something less than 4 cents per kilowatt-hour.

Mr. **Walker**. Finally, if you get a restart on unit No. 1, how much of an improvement would that make in the economic condition of GPU, and what assurances can you give us the revenues derived from unit No. 1 would be committed to the cleanup of unit No. 2?

Mr. **Kuhns**. The problem we have—let me back up. Certainly, as we have said and others have indicated, the return of unit 1 to service is very important to the financial viability of the GPU system. It's important to the customer as well. It will, as we indicated to our stockholders a couple of weeks ago at the annual meeting, provide an earnings increase at that point on an annual basis of about $1 a share, 90 cents to a dollar a share, a significant increment in earnings.

The problems we have is cash, and it does not result in that much of an increase in cash. The ratemaking commission in Pennsylvania particularly provided the company with enough cash to keep it off the precipice of bankruptcy, as the chairman suggested we were approaching or on, in the form of providing for an increased rate of amortization of unit 2, so that we increased the depreciation rate, if you will, amortization rate, the rate of recovery of that investment, to get that cash.

The ratemaking treatment provides that that is reversed in a sense at the time of restart. Those amortization dollars are—some of them—transferred to earnings, but the cash doesn't change. The fact that the revenues of the company go down when unit 1 starts is an overall indication that there's not additional cash being generated.

For the past 5 years, one of the toughest challenges we have had in holding this whole situation together has been to continue to discharge our public utility responsibility. We didn't have the option of going out of that particular model or discontinuing that particular line of cookies. We had to maintain service to our customers, and I'm kind of proud that our group has been able to do that.

But we've been living on internally generated cash. Restart is not going to really change that all that much, and we have to look at the fact that we've been living in a very constrained fashion and we need some of that cash to do things that we haven't been able to do.

The conditions of restart are unknown at this point. We know that the NRC has proposed limited capability for a while, limited capacity for a while. We don't know what that will ultimately turn out to be.

The ratemaking result of restart, in other words, is not that assured. We don't know—in Pennsylvania it's going to be fairly automatic once the 35-percent power for 100 consecutive hours is generated. New Jersey has the same standard of 35 percent and 100 hours, but has only promised an expedited proceeding to get it into rates. So that the results of that ratemaking are not going to be immediate.

We also are before both commissions now for 1984 cases that were filed in both Pennsylvania and New Jersey in January 1984. Hearings have been held. Those cases will normally not be disposed of until later this year, September or November.

The point I'm trying to make, Congressman Walker, is there are enough uncertainties and calls upon our cash needs that I simply can't sit here today and tell you that, if unit 1 restarts, we will provide *x* million of dollars a year to the cleanup. We clearly recognize our responsibility to remove that fuel core and reduce the risk to the public that that offers, even though, as we've heard today earlier, the safety of that plant has been——

Mr. WALKER. Well, I'm sure there are——

Mr. **Kuhns** [continuing]. Significantly increased.

Mr. **Walker**. I'm sure there are a number of demands on whatever internal cash flow you're able to generate, but is there anything that can be of higher priority in terms of that cash flow than the cleanup of unit No. 2?

Mr. **Kuhns**. Not in—no, except you've got to be able to do it. And if, for instance, we had gone under 5 years ago or between now and 5 years ago, we wouldn't be able to do it. And those who suggest that our feet be held to the fire, if you will, to assure that we don't start unit 1 until TMI-2 cleanup funding is in place, I think are going down the wrong road.

I think Dr. Snyder said it correctly a little while earlier this afternoon in the sense that this cleanup is never going to be in the bag. We're never going to have all the money needed for this task in the bank, and we're going to have to take it as we've been doing it, I think probably efficiently, and we can see now an accelerated accessing of the core and getting that fuel out if we can get through these next 2 or 3 years. And we're going to have to approach it just that way.

And if we say to ourselves, "Well, we're not going to do that; we're not going to let you start that unless we have all the money in the bank," we're not going to get there.

Mr. **Walker**. But it doesn't disparage the record of what's been accomplished so far to suggest that there are some of us who are a little queasy about the results that may be achieved unless there is some mandate across the board that we are going to get unit 2 cleaned up.

You have a commitment to it because you're there. I mean, that's obviously a fairly strong driving force. We don't see very much of a driving force on the industry. Obviously, they haven't felt driven enough to even come up with the minimum number of pledges at this point.

There is very little political driving force around the country, as you're mentioning with regard to the utility commissions. There is virtually no political driving force in this body. Other than a few of us on this subcommittee who have managed to put together the money for the R&D, there has been nothing done by this Congress to help in the TMI situation, and there is very little hope that there is going to be anything done in the future.

It is a convenient political football whenever the issue comes up, and it is absolutely disgusting to see the political establishment unable to respond to what is a legitimate national need, but that in fact is the case.

Given that kind of a process, then it does become desirable, it seems to me, to get some kind of sense that we are going to proceed on. The one factor in all those funding plans, as I said before, that was there was the fact that we are going to have unit 1 revenues as a part of the base to fund cleanup.

I get a little concerned, I get a little upset, when it's suggested to me that that particular base also may be compromised because I see it as a major factor in accomplishing those things that need to be accomplished in the future. That's the reason for the question.

Mr. **Kuhns**. Well, I don't want to give the impression that I'm suggesting that it's not important or it doesn't matter in terms of the ability to carry out the cleanup program and to get that core out. All I want to avoid, because I can't be specific about it, is to suggest that *x* million will be available the day after TMI-1 restarts. It's just not possible for me to say that.

I would underline our feeling of responsibility for the cleanup, for protecting the health and safety. I think we've discharged that responsibility very well in these past 5 years, and we're not going to walk away from that, and we are there. And that is the No. 1 task that we face at Three Mile Island; there's no question about it.

I'll tell you this, Mr. Walker: that unless and until unit 1 does restart—and please don't anybody accept this as a threat; I don't mean it as that—the ability of our company to do the job on TMI-2 is just—is not there.

Mr. **Walker**. Well, let me understand your commitment. Do I understand your commitment as being to the safest and fastest schedule of cleanup which insures both public health and safety?

Mr. **Kuhns**. It certainly is. I have to qualify it in terms of the funds that are available.

I left out one thing as I was going along. I'm reminded here that, with restart, 15 million additional dollars a year go into the cleanup right away. So that's good money.

I have not given up on the industry, Congressman Walker; I really haven't. And I think if we get that, we're going to do it.

Mr. **Walker**. The commitment that you've just referred to, is your board of directors pledged to that kind of commitment? Do they support that kind of commitment?

Mr. **Kuhns**. Not the $15 million, you don't mean; the——

Mr. **Walker**. No, no. I'm talking about the overall commitment to the——

Mr. **Kuhns**. The overall corporate commitment?

Mr. **Walker**. The corporate commitment to a safe, fast cleanup with a total emphasis on public health and safety.

Mr. **Kuhns**. Absolutely. We have—I don't know that we've passed a specific resolution, but it's been in all of our announcements. It's our No. 1 goal in our company.

Mr. **Walker**. To go to another issue that we've discussed over a period of years, and this will be the final thing that I want to raise, but I do want to get something on the record on it, too. We now have about 1 million gallons of water contaminated by tritium on the island, as I understand it, and that tritium cannot be removed since it's an isotope of hydrogen. We've gone through all that before.

As you know, I'm unalterably opposed to putting any of that water into the Susquehanna River at any point. Can you tell me now what the disposal plans are for that water, and can we make a—can we get a commitment from you that we're not going to stick that in the drinking water of my constituents?

Mr. **Kuhns**. I'd ask Mr. Clark to review that, please.

Mr. **Clark**. I think, as you know, Congressman, the water is stored onsite. We built special million-gallon tanks to hold it. The water is stored there. We are using it in the cleanup by recycling it and then cleaning it again, putting it back in the tank.

We have no plan to dispose of that water in the foreseeable future and are expending no effort to try to find ways to dump it, or whatnot. The plan at this point is to continue to store it, use it in the cleanup as we proceed here.

Mr. Walker. Well——

Mr. Kuhns. I would just add that there are no plans to do it. If there ever were any plans or thoughts to do it, it would not be in the dark of night; it would be subject to the broadest kind of public discussion and wouldn't be done unless there was a strong consensus that it was OK to do.

Mr. Walker. Of course, right now you're——

Mr. Kuhns. We're not taking on that issue, Mr.——

Mr. Walker. Right now you're locked up by the law in terms of dumping the water. Is it necessary to continue that law?

Mr. Kuhns. No, sir. It was not necessary to pass it.

Mr. Walker. Well, until we passed the law, we still had much talk and many rumors about the fact that disposal of the water was going to be in the river. We have had a change in tenor and a change in attitude about disposal of the water since the law was passed.

It would be helpful, I think, to many—again, many people in my area—to understand just exactly what it is that might be done with the water in the future, so that some of those things can be considered over a long period of time and aren't just considered at the time when someone comes forward with the latest plan.

It was always understood in the course of it that one of the options was to use the water in the cleanup. I think that's a reasonable kind of thing to be done. That makes good use of the water, but you still have a—not to use a pun, but you still have a "downstream fear" about what might be done in the future, and that is something that I think we want to make certain that is—continues to get attention.

With that, Madam Chairman, I thank you, and I yield back the balance of my time.

Mrs. Lloyd. Thank you very much, Mr. Walker.

We want to thank you again, gentlemen, for being with us today, and all of our witnesses.

If there are no further comments, the committee stands adjourned.

[Whereupon, at 4:25 p.m., the subcommittee recessed, to reconvene at the call of the Chair.]

APPENDIX I

SUPPLEMENTAL QUESTIONS AND ANSWERS FOR THE RECORD

Department of Energy
Washington, D.C. 20585

July 19, 1984

Honorable Marilyn Lloyd
Chairman
Subcommittee on Energy Research and
  Production
Committee on Science and Technology
House of Representatives
Washington, D. C.   20515

Dear Madam Chairman:

On May 22, 1984, Assistant Secretary Shelby T. Brewer appeared before your Subcommittee to discuss Three Mile Island.

Following that hearing, you submitted written questions for response to supplement the record. Enclosed are the answers to those questions.

If you have any questions, please call Diana Diamond or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

Thomas H. Pretorius

for Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosure

cc. Ms. Nancy Jeffery

Questions Submitted by Congresswoman Lloyd

Three Mile Island

QUESTION: In response to the TMI accident, the utility industry established the Institute for Nuclear Power Operations (INPO). One of the key goals of INPO is to improve the involvement of top utility management in the safety of their plant. Do you think that INPO has been effective in improving management commitment to safe operations?

ANSWER: Yes. Top management's commitment to strive for excellence in the safe operation of nuclear powerplants has been evident based on industry's self-improvement initiatives, including INPO. These initiatives include substantial additional resources devoted to training (personnel, facilities, and simulators), steady increases in engineering support of plant operations, increased plant maintenance facilities, reduction in worker radiation exposures and lost time industrial safety accidents, and gradual reduction in the number of unplanned reactor trips.

The theme of INPO's September 1983 CEO Workshop was "Management Involvement" and top management has continued to strengthen its commitment and responsiveness to INPO programs. Management involvement in followup on INPO evaluations and lessons learned from analysis of operating events has increased. All utilities have committed to exert best efforts to have key operating plant training programs ready for INPO accreditation by the end of 1986. In addition, senior utility executives recently told the NRC that they intend to increase their involvement in INPO evaluations at other plants, develop and promulgate goals that reflect a commitment to excellence in operations, and develop and use a nuclear plant performance indicator system to monitor performance of their plants.

Question Submitted by Congressman Torricelli

Three Mile Island

QUESTION: Why haven't utilities in New York, Illinois and California decided to contribute to the cleanup? They get major benefits from the R&D. Even the Japanese see the benefits and are contributing $18 million.

ANSWER: The utility industry and many of its member companies have recognized the major R&D benefits to be obtained from the TMI cleanup and have proposed to contribute. However, some state regulatory bodies have not approved such participation. New York utilities petitioned the New York Public Service Commission (NYPSC) with a strong emphasis on the R&D value; the petition, however, was denied by the NYPSC. Illinois companies have considered petitioning the Illinois Commerce Commission for participation; however, there have been negative reactions expressed by the Consumer Advocate. There are California utilities also interested in participating, but I understand the state regulatory body has disapproved such participation.

In spite of problems such as these, over $80 million has been pledged to the EEI Fund Drive. We are continuing to persuade the utilities to complete their fund-raising process and hope that they will be able to do so in the near future.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 14, 1984

The Honorable Marilyn Lloyd, Chairman
Subcommittee on Energy Research and Production
Committee on Science and Technology
United States House of Representatives
Washington, DC 20515

Dear Madam Chairman:

Attached are the responses of Dr. Harold Denton, Director, Office of Nuclear Reactor Regulation, to questions that you submitted by letter dated June 27, 1984. These responses are intended to supplement the record of the Subcommittee's May 22, 1984 hearing on Lessons Learned in Utility Management and the Status of the R&D Program Following the Accident at Three Mile Island.

Please contact us again whenever we can be of assistance.

Sincerely,

Carlton Kammerer, Director
Office of Congressional Affairs

Attachment:
As stated

QUESTION 1. IN RESPONSE TO THE TMI ACCIDENT, THE UTILITY INDUSTRY ESTABLISHED THE INSTITUTE FOR NUCLEAR POWER OPERATIONS (INPO). ONE OF THE KEY GOALS OF INPO IS TO IMPROVE THE INVOLVEMENT OF TOP UTILITY MANAGEMENT IN THE SAFETY OF THEIR PLANT. DO YOU THINK THAT INPO HAS BEEN EFFECTIVE IN IMPROVING MANAGEMENT COMMITMENT TO SAFE OPERATIONS?

ANSWER.

YES, I BELIEVE INPO HAS BEEN GENERALLY EFFECTIVE IN GETTING UTILITY MANAGEMENT TO BETTER FOCUS ON THE SAFE OPERATION OF THEIR NUCLEAR FACILITIES. HOWEVER, I DO HAVE A CONCERN THAT INPO, DUE TO THE VOLUNTARY NATURE OF THEIR PROGRAMS, MAY EXPERIENCE DIFFICULTY IN GETTING IMPROVEMENT FROM THE POOREST PERFORMING NUCLEAR UTILITIES. THIS SITUATION SHOULD BE HELPED IN THE FUTURE BY THE RECENT FORMATION OF THE NUCLEAR UTILITY MANAGEMENT AND HUMAN RESOURCES COMMITTEE (NUMARC). THE NUMARC CONSISTS OF SENIOR MANAGEMENT OFFICIALS FROM SEVERAL UTILITIES AND REPRESENTS ALL NUCLEAR UTILITIES. THE COMMITTEE HAS DEVELOPED SEVERAL SELF-IMPROVEMENT INITIATIVES FOR THE INDUSTRY WHICH ARE RELATED TO MANAGEMENT. ALL OF THE SELF-IMPROVEMENT INITIATIVES MADE BY NUMARC ON BEHALF OF INDUSTRY RELY HEAVILY ON INPO FOR GUIDANCE, COORDINATION AND EVALUATION. I BELIEVE THAT

QUESTION 1. (CONTINUED)

THIS ADDED RELIANCE ON INPO BY INDUSTRY WILL CAUSE GREATER PEER PRESSURE ON THE POOR PERFORMERS AND THEREBY INCREASE THE EFFECTIVENESS OF THE OVERALL INPO PROGRAM. NATURALLY, WE SHALL CONTINUE TO MONITOR AND AUDIT THE INPO PROGRAM'S EFFECTIVENESS TO ASSURE THAT IT DOES NOT WAVER FROM ITS STATED OBJECTIVE OF "...PROMOTING IMPROVED SAFETY AND RELIABILITY IN THE MANAGEMENT AND OPERATION OF NUCLEAR PLANTS."

QUESTION 2. DO NRC AND INPO (INSTITUTE OF NUCLEAR POWER OPERATIONS) PROGRAMS COMPLEMENT EACH OTHER? CAN YOU GIVE SOME GENERIC EXAMPLES WHERE INPO HAS IMPROVED PLANT OPERATIONS? DOES THE NRC RELY ON INPO FINDINGS IN ANY OF ITS REGULATORY FUNCTIONS? CAN YOU EXPLAIN HOW INPO AND THE NRC ARE COOPERATING WITH RESPECT TO CERTIFYING UTILITY PERSONNEL TRAINING PROGRAMS?

ANSWER.

THE NRC AND INPO SIGNED A MEMORANDUM OF AGREEMENT (MOA) EFFECTIVE APRIL 1, 1982, PROVIDING FOR MUTUAL COOPERATION AND COMPLEMENTARY ACTIVITIES IN THE EXCHANGE OF EXPERIENCE, INFORMATION, AND DATA RELATED TO THE SAFE OPERATION OF NUCLEAR POWER PLANTS. THE MOA SPECIFIES THAT THE NRC WILL CONSIDER THE INFORMATION AND RECOMMENDATIONS PROVIDED BY INPO IN THE DEVELOPMENT OR REVISION OF RULES AND REGULATORY GUIDES. THE APPENDICES TO THE MOA IDENTIFY THE FOLLOWING AREAS OF COOPERATION: EVENT ANALYSIS, APPRAISAL AND EVALUATION ACTIVITIES, RADIOLOGICAL PROTECTION ACTIVITIES AND TRAINING RELATED ACTIVITIES. IN THE AREA OF EVENT ANALYSIS, INPO HAS BEEN INSTRUMENTAL IN THE OPERATION OF THE NUCLEAR PLANT RELIABILITY DATA SYSTEM (NPRDS) WHICH HAS ENHANCED SAFE PLANT

QUESTION 2. (CONTINUED)

OPERATION THROUGH IMPROVED EVALUATION AND DISSEMINATION OF INFORMATION OF POTENTIAL SAFETY SIGNIFICANCE TO NUCLEAR PLANT LICENSEES. INPO HAS DEVELOPED PROGRAMS TO CONDUCT EVALUATIONS OF CONSTRUCTION PROJECTS, OPERATING REACTORS, AND UTILITY MANAGEMENT INVOLVEMENT IN NUCLEAR OPERATIONS. THESE EVALUATIONS BY AN INDUSTRY GROUP PROVIDE UTILITIES WITH A POSITIVE INCENTIVE TO MAKE VOLUNTARY IMPROVEMENTS TO THEIR NUCLEAR FACILITIES AND OPERATIONS, THEREBY MINIMIZING THE NECESSITY FOR NRC-SPONSORED APPRAISALS. SIMILARLY, INPO CONDUCTS RADIOLOGICAL PROTECTION PROGRAM REVIEWS AS PART OF ITS PLANT EVALUATION ACTIVITIES. THESE REVIEWS AID THE NRC IN CONFIRMING THAT WORKER EXPOSURES ARE MAINTAINED AS LOW AS REASONABLY ACHIEVABLE (ALARA). IN THE AREA OF TRAINING-RELATED ACTIVITIES, NRC AND INPO HOLD QUARTERLY HUMAN FACTORS COORDINATION MEETINGS TO PROMOTE IMPROVED NUCLEAR UTILITY TRAINING. INPO HAS DEVELOPED AN ACCREDITATION PROGRAM AND CREATED AN ACCREDITING BOARD WHICH MAKES ALL DECISIONS WITH RESPECT TO ACCREDITATION OF UTILITY TRAINING PROGRAMS. THE NRC REVIEWS THE ACCREDITATION PROGRAM ACTIVITIES TO ASSURE CONSISTENCY WITH EXISTING REGULATIONS, AND RECOMMENDS ONE MEMBER FOR A POSITION ON THE INPO ACCREDITING BOARD. THESE COORDINATED ACTIVITIES PREVENT DUPLICATION OF EFFORT AND PROMOTE THE COMMON GOAL OF IMPROVED PLANT OPERATIONS.

QUESTION 3. HAVE ALL OF THE PROPOSALS TO RESPOND TO THE TMI ACCIDENT WHICH WERE CONTAINED IN THE NRC'S "ACTION PLAN" BEEN PUT IN PLACE? WHAT PART OF THE ACTION PLAN PROPOSALS HAVE BEEN IMPLEMENTED, HOW MUCH OF THE PLAN IS STILL BEING WORKED ON, AND WHICH OF THE ACTION PLAN SUGGESTIONS HAVE BEEN DROPPED?

ANSWER.

FOLLOWING THE ACCIDENT AT TMI, THE STAFF DEVELOPED AN ACTION PLAN TO IMPROVE THE REGULATION AND OPERATION OF THE NUCLEAR POWER PLANTS. NUREG-0660, "NRC ACTION PLAN DEVELOPED AS A RESULT OF THE TMI-2 ACCIDENT," WAS ISSUED IN MAY 1980. THIS REPORT INCLUDED ALL THE ACTIONS JUDGED NECESSARY BY THE STAFF.

NUREG-0737, "CLARIFICATION OF TMI ACTION PLAN REQUIREMENTS," DATED NOVEMBER 1980, INCORPORATED A SUBSET OF NUREG-0660 ITEMS WHICH WERE APPROVED FOR IMPLEMENTATION BY THE COMMISSION.

NUREG-0737 REQUIRED THE STAFF TO UNDERTAKE 5551 LICENSING ACTIONS (EXCLUDING ACTIONS IN SUPPLEMENT 1 TO NUREG-0737, AS DISCUSSED BELOW). THE STAFF HAS COMPLETED 5162 ACTIONS. THERE ARE 455 ADDITIONAL ACTIONS FROM SUPPLEMENT 1 TO NUREG-0737. THE STAFF HAS ESTABLISHED SCHEDULES FOR ITEMS WHICH HAVE NOT BEEN

Q 3

COMPLETED (INCLUDING SUPPLEMENT 1 ITEMS) BY ISSUING CONFIRMATORY ORDERS TO ALL OPERATING REACTOR LICENSEES.

NUREG-0660 CONTAINED 255 ITEMS FOR RESOLUTION BY THE STAFF. THE ACTION PLAN ITEMS WERE PRIORITIZED BY THE STAFF IN NUREG-0933, "A PRIORITIZATION OF GENERIC SAFETY ISSUES" DATED DECEMBER 1983. THE SUMMARY STATUS FOR ALL ITEMS COVERED BY NUREG-0660 IS PRESENTED IN TABLES II AND III IN THE INTRODUCTION OF NUREG-0933. THE FOLLOWING IS A BRIEF SUMMARY OF ALL ITEMS COVERED BY NUREG-0660:

ITEMS COVERED BY NUREG-0737....................	63
ITEMS COVERED UNDER OTHER ITEMS................	14
ITEMS RESOLVED.................................	113
HIGH PRIORITY ITEMS............................	17
MEDIUM PRIORITY ITEMS..........................	20
LOW PRIORITY ITEMS.............................	13
ITEMS DROPPED..................................	7
ITEMS TO BE PRIORITIZED........................	2
NON SAFETY ISSUES REQUIRING RESOURCES..........	6
TOTAL	255

Q 3

APPROXIMATELY 90-95% OF THE NUREG-0737 ITEMS (EXCLUDING SUPPLEMENT 1) HAVE BEEN IMPLEMENTED. ITEMS NOT IMPLEMENTED AS YET WILL BE IN PLACE AT THE CONCLUSION OF A LICENSEE'S NEXT SCHEDULED OUTAGE, FOR THE MOST PART. NO ITEMS CONTAINED IN NUREG-0737 HAVE BEEN DROPPED. HOWEVER, SEVEN ITEMS IN NUREG-0660 HAVE BEEN DROPPED BY CONSIDERING THE SIGNIFICANCE OF EACH ITEM AND THE COST OF IMPLEMENTATION.

QUESTION 4. WHAT STEPS HAVE BEEN TAKEN TO IMPROVE CONTROL ROOM DESIGNS SO THAT KEY INFORMATION ON THE SAFETY STATUS OF THE REACTOR IS DISPLAYED IN A FORM EASY FOR OPERATORS TO SEE AND UNDERSTAND? HAVE ALL PLANTS UPGRADED THEIR CONTROL ROOMS TO THE NEW REQUIREMENTS?

ANSWER.

THE TWO NRC INITIATIVES THAT DIRECTLY ADDRESS IMPROVED CONTROL ROOM DESIGNS ARE: 1) THE DETAILED CONTROL ROOM DESIGN REVIEW, AND 2) THE SAFETY PARAMETER DISPLAY SYSTEM. GENERIC LETTER 82-33 OF DECEMBER 17, 1982, REQUIRED APPLICANTS AND LICENSEES TO CONDUCT DETAILED CONTROL ROOM DESIGN REVIEWS AND DESIGN AND INSTALL SAFETY PARAMETER DISPLAY SYSTEMS IN CONTROL ROOMS ON A SCHEDULE TO BE NEGOTIATED WITH NRC PROJECT MANAGERS. AFTER THE NEGOTIATIONS, THE SCHEDULES WERE MADE ENFORCEABLE BY ISSUANCE OF ORDERS OR BY INSERTING CONDITIONS INTO OPERATING LICENSES.

THE PURPOSE OF THE DETAILED CONTROL ROOM DESIGN REVIEW IS TO IMPROVE THE ABILITY OF NUCLEAR POWER PLANT OPERATORS TO PREVENT ACCIDENTS OR COPE WITH ACCIDENTS IF THEY OCCUR BY IMPROVING THE INFORMATION PROVIDED TO THEM. THIS IS ACCOMPLISHED BY REVIEWING CONTROL ROOMS AGAINST ACCEPTED HUMAN FACTORS PRINCIPLES.

QUESTION 4. (CONTINUED)

IDENTIFYING DEVIATIONS FROM THESE PRINCIPLES, AND MAKING CONTROL ROOM CHANGES THAT HAVE A POTENTIAL FOR REDUCING SAFETY SIGNIFICANT OPERATOR ERRORS. THE SAFETY PARAMETER DISPLAY SYSTEM PROVIDES A CONCISE DISPLAY OF CRITICAL PLANT VARIABLES TO THE CONTROL ROOM OPERATORS TO AID THEM IN RAPIDLY AND RELIABLY DETERMINING THE SAFETY STATUS OF THE PLANT. IMPROVEMENTS IN EXISTING CONTROL BOARDS RESULTING FROM THE DETAILED CONTROL ROOM DESIGN REVIEW AND THE CONCISE SAFETY OVERVIEW PROVIDED BY THE SAFETY PARAMETER DISPLAY SYSTEM ARE EXPECTED TO IMPROVE THE OPERATOR'S ABILITY TO SEE AND UNDERSTAND THE SAFETY STATUS OF THE REACTOR.

ALL REACTORS LICENSED SINCE THE TMI-2 ACCIDENT HAVE HAD THEIR CONTROL ROOMS UPGRADED TO INCORPORATE HUMAN FACTORS PRINCIPLES. MOST OF THE UTILITIES WITH OPERATING REACTORS HAVE INITIATED THEIR CONTROL ROOM REVIEWS AND SEVERAL HAVE COMPLETED THEM. MORE THAN HALF OF THE UTILITIES WITH OPERATING REACTORS ARE WELL INTO THE DESIGN OF THEIR SAFETY PARAMETER DISPLAY SYSTEMS AND A FEW SYSTEMS ARE INSTALLED.

QUESTION 5. WOULD YOU COMMENT ON THE SITUATION AT THE SHOREHAM PLANT IN NEW YORK WHERE THE STATE AND LOCAL GOVERNMENTS THREATEN TO PREVENT AN OTHERWISE SAFE PLANT FROM OPERATING SIMPLY BY REFUSING TO PARTICIPATE IN THE TESTING OF AN EMERGENCY PLAN? DO YOU FEEL THIS IS A PROPER RESPONSE TO THE EMERGENCY PLANNING SHORTCOMINGS REVEALED AT TMI?

ANSWER.

BECAUSE SUFFOLK COUNTY AND THE STATE OF NEW YORK WILL NOT ADOPT OR IMPLEMENT ANY OFFSITE EMERGENCY RESPONSE PLAN FOR SHOREHAM, THE LONG ISLAND LIGHTING COMPANY (LILCO) HAS DEVELOPED AND SUBMITTED AN OFFSITE EMERGENCY PLAN OF ITS OWN. THIS PLAN GENERALLY PROVIDES FOR LILCO TO SUPPLY ITS OWN PERSONNEL FOR OFFSITE EVACUATION. THE LILCO PLAN HAS BEEN REVIEWED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), WHICH ISSUED A REPORT ON THE PLAN ON MARCH 15, 1984. THE REPORT IDENTIFIED 32 INADEQUACIES IN THE LILCO PLAN, BASED ON JOINT NRC/FEMA STANDARDS AND CRITERIA CONTAINED IN NUREG-0654. SOME OF THE INADEQUACIES CENTERED ON ISSUES CONCERNING THE LEGAL AUTHORITY OF LILCO TO DO ITS OWN EMERGENCY PLANNING.

Q 5

PURSUANT TO DIRECTION FROM THE COMMISSION IN MAY, 1983 (CLI-83-13), THE ADEQUACY OF THE LILCO PLAN IS BEING LITIGATED BEFORE A LICENSING BOARD. HEARINGS BEGAN ON DECEMBER 6, 1983, AND ARE EXPECTED TO CONTINUE THROUGH THE SUMMER. SUFFOLK COUNTY AND THE STATE OF NEW YORK ARE ACTIVE INTERVENORS IN OPPOSITION TO THE ISSUANCE OF A LICENSE. THEY HAVE ALSO FILED LAWSUITS IN NEW YORK STATE COURTS TO HAVE THE LILCO PLAN ENJOINED ON THE GROUNDS THAT THE LILCO PLAN ILLEGALLY ENCROACHES ON AUTHORITY DELEGATED BY STATE STATUTE TO STATE AND LOCAL GOVERNMENTS.

BECAUSE THE LITIGATION REGARDING THE SHOREHAM EMERGENCY PLAN IS CONTINUING, I DO NOT FEEL THAT I SHOULD COMMENT ON THE PROPRIETY OF ANY ACTIONS TAKEN TO DATE BY THE STATE AND LOCAL GOVERNMENTS.

QUESTION 6. THE KEMENY COMMISSION SAID THAT A NEW LAYER OF REGULATIONS WOULD NOT BE THE PROPER RESPONSE TO THE ACCIDENT, BUT THAT FUNDAMENTAL CHANGES WERE NEEDED IN THE ORGANIZATION, PROCEDURES, PRACTICES AND ATTITUDES OF THE NRC AND OF THE NUCLEAR INDUSTRY. WOULD YOU SAY THAT THE NRC'S RESPONSE TO TMI CAN BE BETTER CHARACTERIZED AS A NEW LAYER OF REGULATIONS OR AS FUNDAMENTAL CHANGES? HAS THE INDUSTRY UNDERGONE FUNDAMENTAL CHANGES?

ANSWER.

I AGREED WITH THE KEMENY COMMISSION FINDINGS THAT FUNDAMENTAL CHANGES TO THE REGULATORY PROCESS WERE NEEDED AND BELIEVE THAT NRC'S RESPONSE TO TMI CAN BE BEST CHARACTERIZED AS MAKING FUNDAMENTAL CHANGES IN ITS APPROACH. FOR EXAMPLE, TMI TAUGHT US NOT TO IGNORE THE ROLE OF HUMANS IN SAFE PLANT OPERATION. ACCORDINGLY, WE HAVE GIVEN GREATER EMPHASIS TO THE HUMAN-RELATED ASPECTS ASSOCIATED WITH THE SAFETY OF NUCLEAR POWER PLANTS, PARTICULARLY IN THE AREAS OF STAFFING AND QUALIFICATIONS, OPERATING PROCEDURES, AND UTILITY MANAGEMENT AND ORGANIZATION. ANOTHER AREA OF FUNDAMENTAL CHANGE AS A RESULT OF THE ACCIDENT AT TMI IS THE EXPANDED EFFORTS TO COLLECT, ANALYZE AND DISSEMINATE SIGNIFICANT OPERATIONAL DATA ON A TIMELY BASIS.

QUESTION 6. (CONTINUED)

LIKEWISE, THE TMI EXPERIENCE TAUGHT US THAT ACCIDENTS CAN HAPPEN AND NRC HAS RESPONDED BY REQUIRING EFFECTIVE AND CREDIBLE EMERGENCY RESPONSE CAPABILITIES BOTH ON- AND OFF-SITE.

I ALSO BELIEVE THAT THE INDUSTRY HAS UNDERGONE SOME CHANGES IN ORGANIZATION, PROCEDURES, PRACTICES AND ATTITUDE. EVIDENCE OF THIS IS THEIR CREATION OF INPO AND THE ACTIVITIES OF EPRI.

IN CONCLUSION, THE ACCIDENT REFOCUSED PRIORITIES AND RESOURCES WITHIN THE NRC AS THE LESSONS OF TMI WERE IMPLEMENTED. ALTHOUGH SOME OF THE CHANGES RESULTED IN REGULATIONS, THEY SHOULD NOT BE CONSIDERED ANOTHER LAYER OF REGULATION. OUR NEW POLICIES AND APPROACHES REPRESENT A BETTER INTEGRATED, MORE COMPREHENSIVE APPROACH TO REGULATING NUCLEAR PLANTS THAN EXISTED PRIOR TO 1979.

QUESTION 7. WHAT IS THE NRC'S ROLE IN THE CLEANUP OF UNIT 2? HAS THE NRC GIVEN ALL THE NECESSARY APPROVALS FOR THE FUEL TO BE REMOVED? IF NOT, WHAT ARE THE MAJOR REMAINING REGULATORY HURDLES?

ANSWER.

THE NRC HAS OVERALL REGULATORY RESPONSIBILITY FOR ALL CLEANUP ACTIVITIES AT TMI UNIT 2. THE AGENCY'S PRIMARY OBJECTIVES ARE TO ASSURE THAT THE FACILITY IS MAINTAINED IN SAFE SHUTDOWN CONDITION AND THAT CLEANUP OPERATIONS ARE CONDUCTED IN A WAY THAT PROTECTS THE HEALTH AND SAFETY OF THE PUBLIC AND THE WORKFORCE. TO ACCOMPLISH THESE OBJECTIVES, THE NRC CREATED THE THREE MILE ISLAND PROGRAM OFFICE (TMIPO) WITHIN THE OFFICE OF NUCLEAR REACTOR REGULATION (NRR), WHOSE 21 FULL-TIME STAFF MEMBERS ARE STATIONED AT THE TMI SITE AND AT NRC HEADQUARTERS. THE SPECIFIC RESPONSIBILITIES OF THE TMIPO CONSIST OF:

- OVERSIGHT OF ACTUAL CLEANUP OPERATIONS TO ENSURE THAT THEY COMPLY WITH APPROVED ACTIONS, TECHNICAL SPECIFICATIONS AND NRC ORDERS.

- REVIEW OF CLEANUP ALTERNATIVES TO ASSESS SAFETY AND ENVIRONMENTAL IMPACTS.

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- o REVIEW AND EVALUATION OF GPU NUCLEAR (THE TMI LICENSEE) PROPOSALS FOR CLEANUP ACTIVITIES.
- o REVIEW AND APPROVAL OF THE STEP-BY-STEP PROCEDURES FOR EACH MAJOR CLEANUP OPERATION.
- o COORDINATION OF NRC CLEANUP-RELATED ACTIVITIES WITH OTHER GOVERNMENTAL AGENCIES, AS NECESSARY.
- o INFORMING STATE AND LOCAL GOVERNMENTS AND THE PUBLIC ON THE STATUS OF CLEANUP AND PLANNED ACTIVITIES.

GPU NUCLEAR HAS NOT YET SUBMITTED THEIR DETAILED PLAN FOR FUEL REMOVAL; CONSEQUENTLY THE NRC HAS NOT REVIEWED OR APPROVED THE FUEL REMOVAL PROCEDURES. THE NATURE OF THE CLEANUP AND THE APPROVAL PROCESS IS SEQUENTIAL, I.E., EACH MAJOR STEP MUST BE COMPLETED PRIOR TO THE DEVELOPMENT AND APPROVAL OF THE DETAILED PROCEDURES NECESSARY FOR THE NEXT PHASE. THE CURRENT MAJOR CLEANUP ACTIVITY IS THE REACTOR VESSEL HEAD REMOVAL. THE NRC HAS REVIEWED AND APPROVED THE HEAD REMOVAL PROCEDURES PROPOSED BY GPU NUCLEAR. OTHER MAJOR ACTIVITIES WHICH WILL REQUIRE NRC REVIEW AND APPROVAL PRIOR TO FUEL REMOVAL INCLUDE INSPECTION OF THE DAMAGED REACTOR CORE AND PLENUM ASSEMBLY, PLENUM CLEANING AND JACKING, AND PLENUM ASSEMBLY REMOVAL. THE EXTENT OF DAMAGE TO THE PLENUM ASSEMBLY AND OTHER INTERNAL STRUCTURES WILL NOT BE KNOWN UNTIL THE VESSEL HEAD IS REMOVED; THEREFORE, UNCERTAINTIES EXIST IN ESTIMATING THE TIME NEEDED TO COMPLETE THESE ACTIVITIES. HOWEVER, GPU CURRENTLY PLANS TO COMMENCE FUEL REMOVAL IN JULY 1985, SUBJECT TO SUCCESSFUL COMPLETION OF THE PREREQUISITE ACTIVITIES AND NRC APPROVAL OF THE DETAILED DEFUELING PROCEDURES.

QUESTION 8. HAVE RESEARCHERS DETERMINED WHY SUCH LITTLE RADIOACTIVE MATERIAL WAS RELEASED DURING THE TMI ACCIDENT DESPITE THE SEVERE DAMAGE TO THE REACTOR CORE? WHAT WAS THE FINAL STATUS OF THE BULK OF THE RADIOACTIVE PRODUCTS? ARE THERE REASONS TO BELIEVE THAT THE SAME PROCESSES WHICH PREVENTED THE ESCAPE OF LARGE QUANTITIES OF RADIOACTIVE MATERIALS DURING TMI WILL PREDOMINATE DURING OTHER POTENTIAL ACCIDENTS?

ANSWER.

THE TMI-2 ACCIDENT HAS GENERATED A RENEWED INTEREST IN FISSION PRODUCT RELEASE AND TRANSPORT PHENOMENA. EXTENSIVE RESEARCH BY NRC AND THE NUCLEAR INDUSTRY IS NOW BEGINNING TO PROVIDE IMPROVED UNDERSTANDING OF FISSION PRODUCT BEHAVIOR UNDER SEVERE ACCIDENT CONDITIONS. PRELIMINARY RESULTS OF THIS RESEARCH REAFFIRM THE EFFECTIVENESS OF THE LOW LEAKAGE CONTAINMENT STRUCTURE, WHICH CAN BE EXPECTED TO RETAIN MOST OF THE FISSION PRODUCTS FOR MANY POSTULATED ACCIDENTS, EVEN THOUGH THE ACCIDENT CONDITIONS MAY BE MORE SEVERE THAN THOSE POSTULATED AS A DESIGN BASIS. DURING THE TMI ACCIDENT SUFFICIENT CONTAINMENT INTEGRITY WAS MAINTAINED TO PREVENT ANY SIGNIFICANT LEAKAGE OF THE CONTAINMENT ATMOSPHERE AND THE FISSION PRODUCTS CONTAINED THEREIN. THE CONTAINMENT SPRAYS WERE ALSO AVAILABLE TO FURTHER REDUCE THE AMOUNT OF FISSION PRODUCTS AND THEIR LEAKAGE POTENTIAL EVEN IF MORE SEVERE CORE DAMAGE HAD OCCURRED AT TMI-2.

QUESTION 8. (CONTINUED)

THE FISSION PRODUCTS WHICH WERE RELEASED TO THE ENVIRONMENT DURING THE TMI ACCIDENT (PRIMARILY NOBLE GASES AND A SMALL QUANTITY OF IODINE) ESCAPED VIA UNISOLATED LIQUID LINES TO THE AUXILIARY BUILDING. THE BULK OF THE FISSION PRODUCTS, RELEASED FROM THE FUEL, HOWEVER, WERE RETAINED IN THE REACTOR BUILDING IN THE PRIMARY COOLANT SYSTEM, BUILDING SUMP WATER AND BUILDING ATMOSPHERE. THE FINAL DISPOSITION OF THE RADIOACTIVE MATERIALS RELEASED FROM THE CORE IS AS FOLLOWS: THE RADIOACTIVE NOBLE GASES RELEASED TO THE CONTAINMENT ATMOSPHERE WERE RETAINED THERE AND EVENTUALLY DECAYED, EXCEPT FOR THE LONG-LIVED ISOTOPE KR-85 WHICH WAS VENTED TO THE ENVIRONMENT IN 1980. THE BULK OF OTHER RADIOACTIVE MATERIALS THAT WERE RELEASED FROM THE FUEL DURING THE ACCIDENT WERE ENTRAINED IN COOLANT WATER AND WERE EVENTUALLY PROCESSED BY THE POST-ACCIDENT CLEANUP SYSTEMS. THE EPICOR-II SYSTEM, A THREE-STAGE LIQUID RADWASTE PROCESSING SYSTEM DESIGNED TO CLEAN UP INTERMEDIATE-LEVEL RADIOACTIVE WASTE WATER, WAS USED TO PROCESS 570,000 GALLONS OF ACCIDENT-RELATED WATER IN THE AUXILIARY BUILDING. THIS OPERATION, COMPLETED IN OCTOBER 1980, GENERATED RADIOACTIVE WASTES IN THE FORM OF 72 SPENT LINERS WHICH WERE SUBSEQUENTLY SHIPPED OFFSITE, EITHER TO THE LOW LEVEL COMMERCIAL BURIAL SITE AT RICHLAND, WASHINGTON, OR TO THE IDAHO NATIONAL ENGINEERING LABORATORY FOR RESEARCH, STORAGE, AND ULTIMATE DISPOSAL. THE SUBMERGED DEMINERALIZER SYSTEM (SDS), A MULTISTAGE, LIQUID RADWASTE SYSTEM DESIGNED FOR THE PROCESSING OF HIGHLY RADIOACTIVE WATER, WAS USED TO CLEAN UP MORE THAN

QUESTION 8. (CONTINUED)

650,000 GALLONS OF HIGH ACTIVITY REACTOR BUILDING SUMP WATER AND HAS ALSO BEEN USED TO REDUCE THE ACTIVITY IN THE PRIMARY COOLANT SYSTEM. THE SPENT-FILTER AND ION-EXCHANGE VESSELS GENERATED FROM THE HIGH-LEVEL WASTEWATER PROCESSING HAVE BEEN SAFELY SHIPPED TO THE DOE FACILITY AT HANFORD, WASHINGTON, FOR RESEARCH AND DEVELOPMENT. THESE SHIPMENTS ACCOUNT FOR OVER 90% OF THE RADIOACTIVE FISSION PRODUCTS THAT WERE RELEASED FROM THE REACTOR CORE. THE REMAINING FISSION PRODUCTS ARE BELIEVED TO BE RETAINED IN THE FUEL, CONTAINED IN THE MAKEUP AND PURIFICATION DEMINERALIZER RESINS AND REACTOR BUILDING SUMP SLUDGE, AND TO HAVE COLLECTED ON PRIMARY COOLANT SYSTEM SURFACES. PROCESSING OF THE PRIMARY COOLANT SYSTEM WATER THROUGH THE SDS IS CONTINUING, BUT DECONTAMINATION OF THE RCS SURFACES WILL NOT BE PERFORMED UNTIL AFTER FUEL REMOVAL. REMOVAL OF THE RADIOACTIVITY ON THE HIGHLY CONTAMINATED RESINS WILL COMMENCE SHORTLY, FOLLOWING THE INSTALLATION OF THE CESIUM ELUTION SYSTEM. THE REACTOR BUILDING SUMP SLUDGE ALSO WILL NOT BE DECONTAMINATED UNTIL FUEL REMOVAL IS COMPLETED.

FOR OTHER POTENTIAL ACCIDENTS, THE PROCESSES PRIMARILY RESPONSIBLE FOR THE RETENTION OF FISSION PRODUCTS AT TMI WOULD BE SIMILARLY EFFECTIVE IF THE SEVERITY OF THE POSTULATED EVENT DOES NOT EXCEED THAT EXPERIENCED AT TMI. FOR POSTULATED ACCIDENTS MORE SEVERE THAN TMI, E.G., ACCIDENTS WHICH RESULT IN MELTING OF THE CORE, EVENTUAL MELT-THROUGH OF THE REACTOR

QUESTION 8. (CONTINUED)

VESSEL, AND FAILURE OF THE REACTOR CONTAINMENT, THESE PROCESSES WOULD HAVE BEEN LESS EFFECTIVE THAN AT TMI RESULTING IN FISSION PRODUCT RELEASES ANALYTICALLY PREDICTED TO BE MUCH LARGER THAN THE TMI RELEASES. THE AGENCY AND INDUSTRY IS CURRENTLY SPONSORING EXTENSIVE RESEARCH INTO THE POTENTIAL SOURCE TERM MAGNITUDES FROM POSTULATED CORE DAMAGE ACCIDENTS MORE SEVERE THAN TMI. THE AIM OF THESE EFFORTS IS TO BUILD ON TO THAT KNOWLEDGE BASE ACQUIRED FROM TMI AND TO OBTAIN AS REALISTIC PREDICTIONS AS IS POSSIBLE ON THE FISSION PRODUCT BEHAVIOR IN SEVERE ACCIDENTS. PRELIMINARY RESULTS THUS FAR INDICATE THAT THE EXPECTED RELEASES ARE LOWER THAN PREVIOUS ESTIMATES FOR MOST ALL OF THE POSTULATED ACCIDENT SEQUENCES - THE DEGREE OF REDUCTION WILL DEPEND ON THE PARTICULAR ACCIDENT SEQUENCE INVOLVED. WHILE IT IS BELIEVED PREMATURE TO SPECULATE ON THE FINAL PREDICTIONS, IT SHOULD BE NOTED THAT THESE RESEARCH RESULTS ARE SCHEDULED FOR PUBLICATION LATE THIS CALENDAR YEAR AFTER EXTENSIVE PEER REVIEW HAS BEEN COMPLETED (SUCH AS THE REVIEW NOW ONGOING BY THE AMERICAN PHYSICAL SOCIETY AND OTHERS).

QUESTION 9. ARE THERE ANY SAFETY PROBLEMS PREVENTING THE RESTART OF UNIT 1 OF TMI? WHY HAS IT TAKEN MORE THAN FIVE YEARS TO RESTART THE UNDAMAGED REACTOR UNIT 1 AT TMI?

ANSWER.

THE CURRENT SAFETY ISSUES SURROUNDING TMI-1 RESTART MAY BE GENERALLY CHARACTERIZED AS RESTART PROCEEDING ISSUES AND STEAM GENERATOR REPAIR ISSUES. WITH RESPECT TO THE RESTART PROCEEDING, THE COMMISSION, BY ORDER DATED AUGUST 9, 1979, ESTABLISHED THE BASIC PROCESS FOR ANY SUBSEQUENT RESTART OF TMI-1. THE REQUIRED ACTIONS INCLUDED (1) THE COMPLETION BY LICENSEE OF CERTAIN SHORT-TERM ACTIONS, (2) A SHOWING OF REASONABLE PROGRESS BY LICENSEE ON CERTAIN ADDITIONAL LONG-TERM ACTIONS, AND (3) PUBLIC HEARINGS BEFORE AN ATOMIC SAFETY AND LICENSING BOARD (ASLB) TO DETERMINE WHETHER THE ACTIONS OF (1) AND (2), ABOVE, ARE NECESSARY AND SUFFICIENT TO PROVIDE REASONABLE ASSURANCE THAT TMI-1 CAN BE OPERATED WITHOUT ENDANGERING THE HEALTH AND SAFETY OF THE PUBLIC.

THE ASLB CONDUCTED THE PUBLIC HEARINGS AND, IN A SERIES OF DECISIONS ISSUED IN 1981 AND 1982, MADE THE REQUIRED FINDINGS WITH SOME REVISIONS TO THE SHORT AND LONG-TERM ACTIONS.

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THEREFORE, PER THE ASLB FINDINGS, REASONABLE ASSURANCE OF SAFE OPERATION OF TMI-1 WILL EXIST ONLY UPON COMPLETION OF, AMONG OTHER THINGS, THE SHORT-TERM ACTIONS. HOWEVER, AT THE PRESENT TIME, SOME OF THE SHORT-TERM ACTIONS REMAIN INCOMPLETE. ONE ACTION IN PARTICULAR, REGARDING THE EMERGENCY PREPAREDNESS OF THE HOST AND NEIGHBOR COUNTIES, APPEARS PACING AT THIS TIME. IN ADDITION, THE ATOMIC SAFETY AND LICENSING APPEAL BOARD (ASLAB) HAS RECENTLY REOPENED THE MANAGEMENT PHASE OF THE RESTART PROCEEDING FOR FURTHER HEARINGS BY THE ASLB IN THREE AREAS: THE LICENSEE'S TRAINING AND TESTING PROGRAM, CIRCUMSTANCES SURROUNDING THE 1979 MAILGRAM FROM MR. DIECKAMP TO CONGRESSMAN UDALL, AND LEAK RATE TESTING AT TMI-1. (THE ASLAB HAD ALSO PREVIOUSLY REOPENED THE RESTART PROCEEDING WITH RESPECT TO LEAK RATE TESTING AT TMI-2, BUT THE COMMISSION STAYED THAT DECISION PENDING COMPLETION OF CERTAIN ADDITIONAL ACTIVITIES). THE COMMISSION IS NOW CONSIDERING WHETHER IT SHOULD PROCEED WITH A RESTART DECISION IN LIGHT OF THE ASLAB FINDINGS.

WITH RESPECT TO THE STEAM GENERATOR REPAIRS, WHICH WERE REQUIRED TO RESTORE STEAM GENERATOR INTEGRITY FOLLOWING SEVERE CORROSIVE ATTACK, THE COMMISSION IS CURRENTLY CONSIDERING WHETHER THE ASSOCIATED AMENDMENT TO THE TMI-1 OPERATING LICENSE INVOLVES A SIGNIFICANT HAZARDS CONSIDERATION. THIS AMEMDMENT MUST BE ISSUED BEFORE TMI-1 MAY RETURN TO OPERATION. IF THE COMMISSION DETERMINES THAT A

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SIGNIFICANT HAZARDS CONSIDERATION EXISTS, THEN PUBLIC HEARINGS MUST BE COMPLETED PRIOR TO ISSUANCE OF THE PROPOSED AMENDMENT. THE RESTART PROCEEDING HAS TAKEN AN EXTRAORDINARY AMOUNT OF TIME AND RESOURCES PRINCIPALLY BECAUSE (1) IT COVERS A BROAD RANGE OF ISSUES (E.G., PLANT DESIGN, PROCEDURES, MANAGEMENT, TRAINING, EMERGENCY PLANNING, ETC.) AND (2) IT HAS PROVEN TO BE DYNAMIC INSOFAR AS NEW INFORMATION FREQUENTLY DEVELOPS WHICH REQUIRES FURTHER EVALUATION AND REVIEW BY THE COMMISSION, BOARDS AND/OR PARTIES TO THE PROCEEDING. PERHAPS THE FOREMOST EXAMPLE OF THE DYNAMIC NATURE OF THE PROCEEDING IS THE ISSUE OF MANAGEMENT INTEGRITY. IN THIS REGARD, THE RESTART PROCEEDING EVIDENTIARY HEARINGS BEGAN IN OCTOBER 1980 AND RAN THROUGH JULY 1981. THE EVIDENTIARY HEARINGS WERE SUBSEQUENTLY REOPENED IN OCTOBER 1981, BECAUSE OF CHEATING ON NRC OPERATOR LICENSING EXAMINATIONS. MANAGEMENT INVOLVEMENT WAS ONE OF THE ISSUES OF THIS REOPENED PROCEEDING. AN ASLB DECISION IN THIS MATTER WAS ISSUED IN JULY 1982. HOWEVER, IN DECEMBER 1982, THE NRC UNDERTOOK A REVIEW OF THE TRIAL TRANSCRIPT FROM THE LICENSEE'S CIVIL SUIT AGAINST THE TMI-2 VENDOR (BABCOCK & WILCOX) WHICH HAD BEGUN THE MONTH BEFORE. THIS REVIEW, ALONG WITH CERTAIN OTHER ALLEGATIONS, RAISED NEW CONCERNS OF MANAGEMENT INTEGRITY AND IDENTIFIED THE NEED FOR A NUMBER OF ADDITIONAL INVESTIGATIONS AND REVIEWS. THESE ADDITIONAL INVESTIGATIONS AND REVIEWS REQUIRED MANY THOUSANDS OF PERSON-HOURS AND HAVE ONLY RECENTLY BEEN COMPLETED.

QUESTION 10: HAVE THERE BEEN CHANGES REQUIRED AT UNIT 1 THAT WERE NOT REQUIRED AT OTHER BABCOCK & WILCOX PLANTS?

ANSWER.

YES, THE RESTART PROCEEDING HAS RESULTED IN A NUMBER OF REQUIREMENTS, OR CHANGES, AT TMI-1 THAT HAVE NOT BEEN REQUIRED OF OTHER B&W PLANTS. THESE ADDITIONAL CHANGES ARE GENERALLY RELATED TO THE SPECIFIC CIRCUMSTANCES AT TMI-1, AND/OR THE SPECIFIC ISSUES ADDRESSED WITHIN THE RESTART PROCEEDING. SOME EXAMPLES OF ADDITIONAL REQUIREMENTS WOULD BE: (1) PLANT MODIFICATIONS TO ASSURE THAT CLEANUP ACTIVITIES AT TMI-2 WOULD NOT AFFECT TMI-1 OPERATION, (2) IMPOSITION OF CERTAIN CONDITIONS AND PROCEDURES RESULTING FROM THE ISSUE OF CHEATING ON NRC OPERATOR LICENSING EXAMINATIONS, AND (3) PLANT AND PROCEDURAL MODIFICATIONS INTENDED TO IMPROVE EMERGENCY FEEDWATER SYSTEM RELIABILITY UNTIL THE FINAL MODIFICATIONS ARE COMPLETE.

QUESTION 11. HOW WOULD YOU DESCRIBE THE RELATIONS BETWEEN THE NRC AND GPU SINCE THE ACCIDENT? WOULD YOU SAY THAT GPU HAS GENERALLY BEEN COOPERATIVE WITH THE NRC IN ITS VARIOUS INVESTIGATIONS, OR WOULD YOU SAY THEY HAVE BEEN UNCOOPERATIVE? DO YOU THINK THAT UNIT 1 COULD HAVE BEEN BROUGHT BACK INTO OPERATION ANY SOONER IF GPU MANAGEMENT HAD BEHAVED DIFFERENTLY IN ANY WAY? WHAT IF THERE HAD BEEN CHANGES IN THE TOP MANAGEMENT IMMEDIATELY AFTER THE ACCIDENT?

ANSWER.

I BELIEVE THAT RELATIONS BETWEEN THE NRC STAFF AND GPU HAVE BEEN GOOD SINCE THE ACCIDENT. NRC INVESTIGATIONS ARE CONDUCTED BY THE COMMISSION'S OFFICE OF INVESTIGATIONS, A COMMISSION-LEVEL OFFICE WHICH REPORTS DIRECTLY TO THE COMMISSION AND WHICH IS SEPARATE FROM THE TECHNICAL STAFF. IT IS MY UNDERSTANDING THAT GPU HAS BEEN VERY COOPERATIVE WITH NRC IN ITS INVESTIGATIONS.

THE STAFF'S VIEW OF GPU'S COOPERATION WITH THE NRC IS REFLECTED IN THE MOST RECENT SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP) FOR TMI-1. THE SALP PROGRAM IS AN INTEGRATED PERFORMANCE EVALUATION IN EACH OF ABOUT 10 FUNCTIONAL AREAS AFFECTING PLANT SAFETY USING UP TO 7 EVALUATION CRITERIA TO MAKE A DETERMINATION. ONE OF THE SALP EVALUATION CRITERIA IS RESPONSIVENESS TO NRC INITIATIVES. IMPLICIT THEREIN IS THE DEGREE TO WHICH LICENSEE

Q 11

COOPERATES. REVIEW OF THE MOST RECENT TMI-1 SALP REPORT, COVERING THE PERIOD OCTOBER 1, 1982 THROUGH JANUARY 31, 1984, WOULD INDICATE THAT GPU IS GENERALLY VIEWED AS COOPERATIVE AND STRAIGHTFORWARD IN ITS DEALINGS WITH THE NRC.

WITH RESPECT TO THE SECOND PART OF THE QUESTION, THE ISSUES ENCOMPASSED IN THE RESTART PROCEEDING ARE SIMPLY TOO COMPLEX AND DIVERSE TO PERMIT ANY MEANINGFUL SPECULATION ON WHETHER DIFFERENT GPU MANAGEMENT BEHAVIORS COULD HAVE EXPEDITED ANY RETURN TO OPERATION FOR TMI-1.

GENERAL
PUBLIC
UTILITIES
CORPORATION

William G. Kuhns
Chairman
100 Interpace Parkway
Parsippany, New Jersey 07054
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July 13, 1984

The Honorable Marilyn Lloyd, Chairman
Subcommittee on Energy Research & Production
U.S. House of Representatives
Committee on Science and Technology
Suite 2321 Rayburn House Office Building
Washington, DC 20515

Madam Chairman:

I am pleased to provide the enclosed answers to the questions forwarded by your letter dated June 27, 1984. If you wish additional information, please let me know.

I appreciate the continued interest by you and your committee in seeing that the cleanup of TMI-2 proceeds safely but promptly.

Since we testified before you on May 22, 1984, there has been significant progress toward securing cleanup funding from the investor-owned electric utility industry. Specifically, on June 18, 1984, the EEI Executive Committee voted to remove the $100M threshhold for beginning to provide industry funds; and the Pennsylvania and New Jersey utilities proposed to provide additional R&D funds to supplement the EEI voluntary program to assure the availability of $25M per year for six years. DOE has indicated they plan to provide $18M in R&D funds for cleanup in 1985. Federal R&D funding in later years is not yet provided for and, as indicated in Mr. Clark's testimony to your committee, we recommend that the subcommittee continue to actively encourage and support continued Federal funding to complete the identified R&D tasks.

As I testified, before your committee, restart of the undamaged TMI Unit 1 would, under existing rate-making orders, increase funding available from GPU's Pennsylvania customers to the full Thornburgh Plan level. It would also improve the financial condition of GPU and permit us to consider advancing additional funds again in 1985 and subsequent years. Despite the latest delays, we continue to look forward to a favorable decision by the NRC on restart of Unit 1--hopefully by mid-August.

Jersey Central Power & Light Company/Metropolitan Edison Company/Pennsylvania Electric Company

One of your questions addresses the length of time it is taking to restart Unit 1. It has been a uniquely complicated process that finally appears to be reaching a point of decision. The plant is ready--the people are ready. We have been humbled and humiliated. We have learned our lessons better than anyone, and we bring to our nuclear operations a single-minded dedication to safety and excellence and responsibility.

Sincerely,

W. G. Kuhns
Chairman

Enclosure: Responses to Additional Questions Forwarded
By Marilyn Lloyd, Chairman

cc: President GPU Nuclear Corporation

RESPONSES TO ADDITIONAL QUESTIONS FORWARDED BY MARILYN LLOYD, CHAIRMAN SUBCOMMITTEE ON ENERGY RESEARCH & PRODUCTION LETTER DATED JUNE 27, 1984 TO WILLIAM G. KUHNS

QUESTION 1:

In response to the TMI accident, the utility industry established the Institute for Nuclear Power Operations (INPO). One of the key goals of INPO is to improve the involvement of top utility management in the safety of their plant. Do you think that INPO has been effective in improving management commitment to safe operations?

RESPONSE:

I believe that INPO has been effective in increasing management involvement in assuring safe operation of nuclear plants. While I believe utility management has always been committed to safe operation, INPO has provided needed resources to help effectively carry out that commitment. It has been effective in increasing the visibility that senior management has of its nuclear operations and areas which should be improved. The direct interaction between INPO representatives and senior management and the annual meeting of utility CEOs sponsored by INPO have been major contributors to this result. Two other aspects of INPO activities which have also been helpful to senior management are:

1. INPO's auditors are exposed to all plants in the country and, as a result, are able to audit performance in relationship to the best performance they see.

2. INPO observes and documents the best performance and disseminates that information for all to emulate in the form of "Best Practices".

These elements of the INPO Program not only provide senior management with a real world assessment but also provide meaningful input for improvements.

QUESTIONS 2, 3, 4, and 5:

Is GPU a member of INPO? Have you found your interactions with INPO productive? How many times have INPO investigators been to your plant? Have they given you favorable or unfavorable reviews?

RESPONSE:

GPU is a member of INPO. We have found our interactions with INPO productive.

INPO conducts a variety of programs. The most basic and well known is the Evaluation Visits to the plants. These evaluations typically involve a team of eight to ten INPO people who prepare themselves for the visit by reviewing specific plant documents beforehand and then spend about two weeks at the plant. The evaluation is based on comparison of the actual plant conditions to INPO-developed Standards of Excellence. The evaluations result in formal reports which include the INPO findings and recommendations and our responses. Our policy is to make these reports public.

INPO conducted evaluations of our TMI-1 plant in October 1981 and May 1983. The summaries of these reports are provided in Attachment 1.

INPO also conducted evaluations of our Oyster Creek Plant in August 1981 and October/November 1982. The summaries of these reports are provided in Attachment 2.

In each of the evaluations certain beneficial practices and accomplishments were noted and improvements were recommended in a number of areas. This is typical of all INPO evaluations. The company responds to the INPO findings with a plan of corrective actions and a commitment to achieve the identified correction. The status of such followup action is reported every six months. The timeliness and effectiveness of our corrective actions is considered an indicator of our commitment to excellence of operations.

We consider the overall results of the evaluations, particularly the later ones, favorable.

In addition to the Evaluation Visits, INPO conducts assistance visits to the plants and to corporate headquarters. These typically address a particular area and involve one or two people for one or two days. We have had, and anticipate, the following assistance visits:

Special Assistance Visits

October, 1984 Oyster Creek General Employee Training Review
October, 1984 TMI General Employee Training Review
April 24, 1984 Oyster Creek Emergency Preparedness Visit
July 18, 1983 TMI-1 1983 Emergency Preparedness Review
May 17, 1983 TMI-1 Emergency Plan Review
TMI-1 NPRDS Assistance
December 21, 1983 Vibration Analysis for Rotating Machinery and Familiarization of Site Maintenance Staff with the Uses of an INPO Data Base

They have been helpful and we have responded positively to the INPO comments and suggestions.

INPO also manages the following program:

The Significant Operating Experience Report (SOER) Program

This program evaluates significant events at all of the commercial nuclear power plants and provides the results and their recommendations for action or follow up to all U.S. utilities.

GPU Nuclear follows up each report from INPO and takes any needed corrective action.

The Nuclear Plant Reliability Data System (NPRDS)

NPRDS collects engineering and failure information on selected nuclear plant systems and equipment and maintains a computerized data base at INPO Headquarters. The major functions of NPRDS are to offer a broad based equipment history file to supportplant operations. NPRDS provides a component reliability file for design and analysis. It was designed to help utilities monitor the performance of selected systems and components at nuclear power plants. The broad applications of NPRDS for utilities include:

- o Maintenance of comprehensive equipment history files to support maintenance planning and repair activities.
- o Identification of other plants with similar or identical equipment that may have spares for possible loan.
- o Determination of spare parts stocking based on mean time between failures.
- o Comparison of component failure rates at a given plant with the industry average failure rates.

GPU Nuclear participates fully in this program.

Accreditation Program for Nuclear Utility Training Programs

Utility application of a systematic approach to training is evaluated through the INPO Accreditation Process. In 1983, INPO published accreditation criteria which serve as a basis for obtaining recognition of quality utility training programs. There is a three step process for accreditation of utility training programs. The first step is utility self evaluation. This includes documentation of the utility training programs. The second step is an INPO accreditation team visit which usually consists of a team leader, three-five utility peer evaluators, and three to five INPO evaluators. The combination of self evaluation and accreditation team visits helps to identify areas for potential improvement of training programs. The final stage is approval by a five member panel of utility professionals, industrial training experts and professional educators who make up an Accreditation Board.

GPU Nuclear is in the process of seeking accreditation of training programs (including those for licensed operators) at both TMI-1 and Oyster Creek.

All of these INPO programs are helpful and increasingly effective.

QUESTION 6:

How would you characterize the differences between NRC oversight and INPO oversight?

RESPONSE:

The fundamental difference between INPO and NRC efforts is that NRC, as the government regulator, is involved in setting and enforcing minimum standards while INPO, as a cooperative effort of the utilities themselves, has undertaken to set and achieve standards of excellence--not just minimum standards. The role of each is appropriate. The means used by each are, of course, different.

An important issue currently being addressed is, how the NRC and INPO each can carry out its role so as to recognize the responsibility of the utilities under their licenses and yet ensure true safety. In that regard, there currently is great concern in the utility industry that the effectiveness of INPO and, as a result, achieving the highest level of safety will be undercut by unduly prescriptive regulations such as some now being considered by NRC in the training area. As an industry, we are actively addressing that concern by a new initiative called the Nuclear Utility Management and Human Resources Committee (NUMARC). A brief description of this initiative is included as (Attachment 3). Also included as Attachment 4 is a list of examples of other self-initiated industry improvements in the last five years which was presented to the NRC by Mr. James Miller, president of Georgia Power Company and Chairman of NUMARC.

QUESTIONS 7, 8, and 9:

How far in the future does your current planning project unit 2 activities? Can you tell us when all phases of the cleanup will be complete? What will the status of the plant be when you are finished?

RESPONSE

These questions are addressed in a July 2, 1984 letter from Mr. P. R. Clark, president, GPU Nuclear Corporation, to Dr. B. Snyder, Nuclear Regulatory Commission (Attachment 5).

As discussed therein, we have scheduled the reasonably defined work and plan to begin fuel removal in July 1985. We have also set a target date of third quarter 1987 for completing fuel removal to the point that nuclear criticality can no longer be considered credible.

Beyond that, there is a great deal of uncertainty largely because the "end point" of cleanup is difficult to define. Thus, I cannot tell you what the status of the plant will be at the end of cleanup. We will be evaluating what the proper end point is and will be working with NRC during the coming months to reach agreement on that definition. Resolution of this definition will, of course, be such as to provide assurance that there will be no adverse affect on health and safety of the public or our workers. This uncertainty is not affecting the ability to proceed effectively with cleanup.

QUESTIONS 10, 11, 12, and 13:

Do you plan to restart the reactor? Do you have a projected date for restarting? What will you do with unit 2 if you are not able to restart the reactor? Do you know yet whether the reactor vessel has been damaged beyond repair or whether it well be safe to reuse the vessel?

RESPONSE:

We have not made a decision on restarting the TMI-2 reactor.

Up to this point and for at least the next two years such a decision has little or no impact on how we proceed with cleanup. In addition, the uncertainties which exist regarding the condition and thus the reusability of the plant and its components prevent making a meaningful estimate of what would be required for restart. For example, we do not know yet whether the reactor vessel is damaged and whether it could be safely reused. Major portions of the cleanup must be completed before we can inspect the plant adequately to assess what would be needed to restart it.

As a result of this situation, we consciously decided to spend none of our current effort on evaluating recovery of the plant or on trying to protect it so as to help assure that it can be recovered. This decision allows us to put all our effort and funds on the cleanup itself.

It is clear that restart of the plant would be a major effort and that significant technical and licensing issues would have to be addressed. Any decision to reconstruct the plant would have to show clear economic benefits in comparison with alternate sources of generation.

If we do not restart the reactor after cleanup, it would be decommissioned in a manner analogous to those being considered for other commercial reactors.

QUESTIONS 14, 15, and 16:

What is the most dangerous remaining step in the cleanup operations of unit 2? Has the NRC examined the remaining phases of the cleanup operation from a safety perspective? Has it approved of the plans?

RESPONSE:

I do not believe there are any "dangerous" steps in the cleanup operation. Our primary objective throughout has been to protect the health and safety of the public and of our workers. We have been successful in doing this to date.

As a result of cleanup work so far, the potential risk to the public from the plant has been drastically reduced. The total decay heat is now only 15 kw; therefore, no external core cooling is required. The primary system is being maintained at a temperature of about 85 degrees Fahrenheit and a pressure of less than 100 pounds per square inch. Thus, effectively the normal mechanisms for fission product release (heat and stored energy) are gone. In addition, the most controlling radioactive isotope (iodine) is also gone.

A good measure of the effectiveness of cleanup to date is the actual release of radioactivity from the TMI-2 plant to the environment compared to operating plants.

The total gaseous and liquid radioactivity released from TMI-2 in 1980 was 47,200 curies and .000625 curies, respectively. Of this, about 41,000 curies was the planned controlled release of Krypton. The remaining releases of about 6,200 curies gaseous and .000625 curies liquid was below the average gaseous and liquid releases from all pressurized water reactors in 1980 which was 6930 curies and 425 curies, respectively, published NRC data. While there is no published NRC data to compare with, the 1983 releases from TMI-2 were significantly reduced to 258.7 curies gaseous and .00046 curies liquid.

Other major improvements in the inherent stability of the plant from a potential risk standpoint as a result of the cleanup program have been:

- Recapture, immobilization and shipment off-site of over 350,000 Curies of radio Cesium and Strontium from contaminated water resulting from the accident.
- The addition of the numerous supplementary systems and instruments, providing enhanced plant protection during cleanup.
- Successful decontamination work, permitting access to plant areas important for plant monitoring and control.
- Greatly increased levels of dissolved Boron in the primary coolant, rendering a recriticality accident extremely unlikely.

The TMI-2 Safety Advisory Board, chaired by Dr. James Fletcher, stated in its May 1984 Annual Report:

> "The members of the SAB are unanimous in their opinion that TMI-2 does not currently pose a significant risk to public or worker health and safety."

The remaining work does, of course, require continued care. However, we are convinced the cleanup can be completed safely. NRC has reviewed the overall cleanup program and stated in their Draft Supplement Environmental Impact Statement in December 1983, "The most significant environmental impact defined in the PEIS was the radiation dose to workers during the cleanup operations and offsite dose is not going to be significant." (Reference: NUREG 0683, Supplement No. 1, December 1983, Draft Report, Section 3.0, page 3.1).

Within the overall scope of the cleanup, we prepare Safety Evaluations of each significant step. NRC approves each Safety Evaluation and the procedures and modification packages which control the work. For any proposed activity which requires a change to a document previously approved by NRC, the change to that document is reviewed and approved by the NRC prior to performance of the activity.

QUESTIONS 17, 18, 19, 20, and 21:

When do you now plan to remove the fuel from the reactor? What are your funding needs for fuel removal? How much of that funding is to come from DOE, and how much from all other sources? Is fuel removal the number one priority of the cleanup efforts? If there is a funding shortage, can you divert funds from other cleanup activities to the fuel removal effort?

RESPONSE:

Fuel removal is the number one priority objective at this phase of the cleanup program. As discussed above, we plan to begin removal of the fuel in July 1985 and have a target of the third quarter 1987 to complete removal of fuel from the plant to the point that criticality is no longer credible.

It is not meaningful or practical to define the "funding needs for fuel removal" per se. While that is our highest priority, it is carried out as part of the overall program. A significant part of that program involves keeping the plant safe. While that part of our efforts does not contribute directly to fuel removal, it is necessary to permit fuel removal. Additional parts of the effort, such as reduction of radiation dose rates, are focused on simplifying or speeding up fuel removal efforts. Thus, in a real sense all of our cleanup funds are being directed toward maintaining the plant safe and removing the fuel.

From an overall funding standpoint, the situation looks better now than when I testified to your committee in May. I told you then that we have $93 million available in 1984. This is as much money as we can use effectively. Recent action by the EEI Executive Committee and the New Jersey and Pennsylvania utilities is expected to result in utility funds for the cleanup being available at a rate of $25 million/year for six years starting in 1985.

We and others, such as DOE and NRC, continue our efforts to assure completion of the funding program. In that regard DOE has indicated informally that they plan to provide about $18M to us in 1985. That will make the total DOE contribution to costs incurred by the site through 1985 $63M. We look for additional DOE R&D support in later years.

In Mr. Clark's testimony to your committee on May 22, 1984 he provided recommendations on steps to help ensure timely completion of cleanup in response to your request. Those recommendations addressed in good part the funding issue. They were:

> "In response to your specific request, GPU has several recommendations to make to the Subcommittee. They are not new in the sense of suggesting specific actions in areas where the Committee has not been active. Rather, they suggest continued and perhaps intensified efforts in areas in which you have already been active. Nonetheless, today's circumstances are somewhat difference than those in the past. It is now five years since the TMI-2 accident. A decision by the NRC on Restart of the undamaged Unit 1 seems to be finally at hand. Restart is a key step in assuring that GPU remains strong enough financially to carry out cleanup in a timely way. Assured funding for the cleanup of TMI-2 seems attainable but needs a major final effort.
>
> In that light, we recommend that the Subcommittee should, within its purview, continue to actively encourage and support:
>
> 1. NRC's efforts to reach a timely decision on Restart of TMI-1 on its own merits independent of other issues.
>
> 2. Continued Federal funding sufficient to complete the identified R&D tasks and fully capitalize on the significant learnings from TMI-2 which are of national interest.

3. Completion of an overall program providing assured funding for cleanup.
4. Continued appraisal of NRC regulations and criteria applied to TMI-2 cleanup to assure they are appropriate for the unusual physical conditions of TMI-2 and recognize the contribution that timely completion of the cleanup will make to public safety.

QUESTIONS 22 and 23:

I understand that worker exposure during the cleanup has been much higher than was originally estimated. Why is that? What are you doing to minimize worker exposure during the cleanup?

RESPONSE:

Apparently there is a misunderstanding with regard to radiation exposure to our workers from the cleanup.

First of all, the dose to individual workers throughout the cleanup has been well within Federal regulatory limits of 3 rem/calendar quarter and 12 rem per calendar year. In addition, we have set our own tighter administrative limits of 5 rem/year. To date no worker has received more than 4.5 rem/year.

TABLE I

Highest Individual Annual Whole
Body Dose for TMI-2 Workers
1979-1983

Year	Dose (rem)
1979	4.5
1980	2.1
1981	2.1
1982	3.0
1983	2.7

The total whole body dose to all workers at TMI-2 since the accident up through May 1984 has been 1670 rem. Table 2 shows the collective doses for workers at TMI-2 for the years 1979-1983. These are compared with the average collective doses for all United States commercial light water nuclear power reactors for the same time period.

TABLE 2

Annual Collective Doses (person-rem)

Year	TMI-2	Average for All U.S. Nuclear Power Reactors[1]
1979	488	597
1980	193	791
1981	138	773
1982	384	705
1983	373	753*

[1] Source: Occupational Radiation Exposure at Commercial Nuclear Power Reactors 1982, Annual Report, U.S. Nuclear Regulatory Commission Office of Resource Management, NUREG 0713 Vol. 4, December 1983.

*Preliminary NRC Data

The actual radiation exposure of our workers has been generally consistent with, but below, our estimates. Recently, NRC, in a draft supplement to their PEIS for cleanup increased their estimate of the radiation exposure for the entire cleanup from a prior range of 2,000 to 8,000 person rem to a revised range of 13,000 to 46,000 person rem. NRC has stated that their latest estimate attempts to provide a bounding range of potential exposures. Our estimate for the total collective radiation doses for the TMI-2 cleanup has consistently been expressed as a range--from 16,000 to 28,000 person-rem. Our estimate falls within the bounds of the NRC estimates expressed in the latest draft to their PEIS.

A major element of all of our planning for cleanup is assuring that worker exposure is minimized in accordance with the As Low As Reasonably Achievable (ALARA) principles and practices. The following actions are part of our cleanup activities:

- Radiation work is reviewed by a professional staff of radiological engineers and technicians. These people identify the control measures to be taken to keep doses at a minimum level consistent with the work.

- To keep doses low we rely on shielding, decontamination, use of remote tools, protective clothing, and frequent surveillance by supervision and our radiation protection staff.

- An extensive training program is maintained which demonstrates proper work techniques and includes practice on full-scale models (mock ups) in non-radiation areas to improve work performance, test tools, and develop new work techniques.

QUESTIONS 24, 25, and 26

Why do you think it has taken so long for the NRC to allow you to restart unit 1? Do you think that you could have shortened the time for the NRC review if GPU had done anything differently? What would you do differently in that regard if you had another opportunity?

RESPONSE:

I believe one underlying reason it has taken so long for the NRC to allow restart of TMI Unit 1 is that the TMI-2 accident and the tremondous technical and political attention paid to it created a unique situation with respect to the licensing process. The institutions, including specifically the NRC, its people, and its procedures were unprepared and unable to effectively deal with the challenge. It differed in most respects from situations the Commission had dealt with previously:

1. The accident at TMI-2 resulted, understandably, in unprecedented attention by citizens, local and state officials, and members and staff of the U.S. Congress. This attention made the NRC and its staff wary of ever making a finding of adequacy or of rendering reasonable judgments about speculation or innuendo without the most exhaustive scrutiny.

2. The issues framed by the Commission included "management capability" for which there existed no real criteria or guidelines which could be used to evaluate the subject. This largely undefined "management capability" issue has been expanded and redefined to include competence and integrity. This has allowed the introduction of many allegedly new issues up to the present time.

3. The accident necessarily created a need to derive the learnings from the accident, to understand the hardware and human causes, and to devise and implement changes. While the past was necessarily the basis for evaluating the future, the process has had great difficulty in focusing not on the past but on an assessment of the changes and their appropriateness or adequacy for safe operations in the future. Many of the changes applied to all plants. The NRC has been able to accept the adequacy of changes for all other operating plants and they have continued to operate. Only for TMI-1 have they been thus far unable to reach a conclusion.

4. Over the extended period of the restart proceeding, the distinction between individual or political judgments or preference on nuclear power and the safety as measured by NRC licensing criteria became blurred.

5. The plant involved already had an operating license. There was no real precedent for dealing with broad issues relative to already operating plants.

6. All of the above compounded the long, seemingly endless process which was created. During the five years that this process has been underway, the total issues and record have been so thoroughly and repeatedly discussed and commented on it has been impossible for most people to keep the underlying issues in mind. The extraordinary action taken by the NRC in the Summer of 1979 to make the Shutdown Orders "immediately effective" without a prior hearing and then to keep those orders in place for five years has placed a great burden on our consumers. We have been convinced for two years that the e favorable initial decisions by its ASLB provided to the Commission the basis for lifting the immediate effectiveness of its orders. This would have allowed all pertinent issues to be fully explored but in parallel with plant operation as is normal. The resulting cost to the public would have been far less and more commensurate with the safety significance of the numerous allegations which have taken an inordinate amount of time and resources to resolve.

The unique elements discussed above exacerbated the problems inherent in the NRC regulatory process which can be seen in proceedings elsewhere. The elements of delay by exaggerated charges, by requests for extensions of due dates, and by last minute introduction of new issues or allegations, are obviously being used in many NRC cases. The organization and structure behind these tactics is, I believe, unique to nuclear power opponents. The enclosed recent article on the Government Accountability Project, which has played a role in TMI-1, provides some insight into one aspect of this problem (Attachment 6).

In addition, and not at all insignificant, have been the difficulties and complications which we added to the process. We accept responsibility for the Unit 2 accident and its aftermath. Misunderstandings arising out of confused and inconsistent communications at the time of the accident caused distrust in the eyes of some. The cheating episode was devastating in terms of a rebuilding of the necessary trust and confidence. The criminal indictment of Metropolitan Edison Company on leak rate testing, the detailed review of operating matters before the accident as displayed on the adversarial stage of the B&W lawsuit, and the whistle blowers all added to the negative attitudes about the company. Although these issues largely related to earlier times and to people and procedures not involved in Unit 1 operation today, they presented the regulator with added difficulties.

Things we would like to have done differently include preventing the cheating and enforcing a proper level of understanding and respect for the leak rate testing procedures. We have a high level of confidence that these past deficiencies have been corrected. On the basis of changes and improvements in our organizational structure and overview functions, we believe that any similar deficiencies now would be discovered and corrected in a timely manner. We actively encourage those of our staff who have concerns about their job or conditions that they observe at the plant to report them to their management who will assure that their concerns are thoroughly reviewed.

The plant is ready--the people are ready. We have been humbled and humiliated. We have learned our lessons better then anyone and bring to our nuclear operations a single-minded dedication to safety and excellence and responsibility.

QUESTIONS 27 and 28:

How many reactor operators and senior reactor operators do you now have licensed for unit 1? How many of them were licensed operators at TMI at the time of the accident?

RESPONSE:

As of July 15, 1984 we had 18 reactor operators and 19 senior reactor operators licensed to operate TMI-1.

None of these were licensed to operate TMI-2 before the accident except one - Michael Ross. Mr. Ross was assigned fulltime to Unit 1 as Manager of Operations; but in accordance with company practice at the time, he was also licensed at TMI-2. His actual involvement at TMI-2 was minimal. Mr. Ross's qualifications and suitability for his present position were specifically reviewed and endorsed by the NRC's ASLB and ASLAB.

Of these total numbers, 7 ROs and 6 SROs were licensed to operate TMI-1 at the time of the accident.

QUESTION 29:

Does GPU own a control room simulator for reactor operator training and accident simulation?

RESPONSE:

GPU does not presently have a full-scale control room simulator for TMI-1. Our operators are trained on the B&W simulator at Lynchburg, VA. That has been significantly modified since the TMI-2 accident and provides training on simulated accidents. Our own full-scale TMI-1 simulator is on order and scheduled for delivery in 1985.

In addition, we already have at TMI-1 a basic principles training (BPT) simulator. As discussed in Mr. Clark's testimony to your committee in May, 1984 at page 80, we believe this BPT is a most useful training device to promote operator understanding.

QUESTIONS SUBMITTED BY CONGRESSMAN TORRICELLI

QUESTION 30:

What kind of economic impact would restarting TMI Unit #1 have on New Jersey?

RESPONSE:

Jersey Central Power & Light Company (Jersey Central) owns 25% of TMI-1. The ratemaking to assure timely recognition of the costs and benefits of TMI-1's return to service is in place in New Jersey (and in Pennsylvania too for that matter) and would provide for a base rate increase of $45M with a concomitant reduction in the energy clause (in New Jersey rate parlance a "levelized energy adjustment clause, or LEAC") of $60M or a net reduction to Jersey Central customers of $15M per year. These changes will come about as soon as TMI-1 has received authorization from the NRC for restart and has achieved at least a 35% capacity factor for not less than 100 consecutive hours. (As a point of reference, in the approximately 4-1/2 years that TMI-1 operated prior to the March 1979 accident, the plant achieved an average capacity factor of 74%. This performance resulted in estimated savings to the customers of Jersey Central of approximately $82M.)

For the 75% ownership of GPU's Pennsylvania subsidiaries, the net savings are about $70M/year.

Although the value of energy savings produced by TMI-1 in the future is a factor not only of the level of the plant's operation but also the relative rates of inflation in ownership costs (payroll, regulatory enhancements, maintenance, etc.) and in the alternative replacement power costs driven primarily by fuel, the expectation is that TMI-1 will continue to provide substantial benefits to the owning companies through the remainder of its licensed life of 24 years from today.

QUESTIONS 31, 32, and 33:

What would the costs be if you couldn't start TMI Unit #1 and had to replace it with other capacity to satisfy New Jersey power demand? Who would pay for it? The Customer?

RESPONSE:

The first and most obvious economic consequence of not restarting TMI-1 would be that the customers would not have the opportunity to realize the savings inherent in the ratemaking currently in place for TMI-1's return to service. Further, there would need to be a provision for the recovery of the investment itself before Jersey Central could consider adding some other form of generating capacity to replace the lost capacity. TMI-1 was constructed at a net installed cost of approximately $500 per kilowatt. Therefore, there must be a provision for the recovery of Jersey Central's investment of approximately $100M for its 25% share of the unit before we can realistically consider raising new money to pay for replacement capacity. Further, new capacity (most likely coal) will cost about $2500 per kilowatt installed and would require an estimated eight to ten years to construct. Accordingly, should TMI-1 never be allowed to restart, not only would the customers be denied the economies of operation inherent in the running of the unit but they would in addition (1) have to repay the existing investment and (2) have to pay for construction and operation of a new generating station which would cost at a minimum four times the cost of TMI-1 and would require at least an eight year lead time to construct during which time higher replacement power costs (largely based on oil-fired units) would continue to be experienced. Put very simply, TMI-1 is an exceptional bargain for customers. I am sure you recognize that energy costs are important to a state's ability to attract and retain customers who provide a balanced and healthy economy.

ATTACHMENT 1

THREE MILE ISLAND UNIT 1
October 1981 Evaluation

INPO DETERMINATION:

"Based on the evaluation, it appears that when the outage work in progress is completed, TMI-1 will be ready to operate safely. Additionally, within the scope of the evaluation, the team determined that the plant is in an acceptable material condition and is being maintained shutdown in a safe manner by qualified personnel. Certain beneficial practices and accomplishments were noted:

The commitment by corporate headquarters to acquire top level talent.

The overall commitment to training as demonstrated by the assignment of one entire shift to training, new training facilities, a computer-aided instruction program, and plans for both a basic principles simulator and a full-size plant-specific simulator.

The Operations Department administration including the operations surveillance system and the comprehensive shift turnover process.

The excellent radiological protection training and retraining programs, including the requirement that workers demonstrate their abilities in practice.

The commitment to quality assurance and quality control programs.

The program of management tours of the plant in off-normal hours.

The senior executive technical training program.

Excellent communications among the different organizations at the site.

Dedication and positive morale of station personnel.

Improvements were recommended in a number of areas. The following are considered to be among the most important:

A need exists for more involvement by middle management and supervisors in day-to-day plant operations. In addition, training is needed to increase their ability to identify deficiencies and potential problems.

Programs to analyze in-house events and to derive benefit from industrywide operating experience should be improved.

Many excellent procedures have been developed, but are not yet being used to best advantage. Some of these provide guidance for the preventive maintenance program, work control system, surveillance program, and method of identifying plant deficiencies. They require improvement in implementation. In particular, there is a need for more preventive maintenance and an improved ability to identify deficiencies requiring corrective maintenance.

The plant chemistry improvement program that emphasizes procedures, methods of quality control, and training needs to be completed."

THREE MILE ISLAND UNIT 1
May 1983 Evaluation

INPO DETERMINATION:

"Within the scope of this evaluation, the team determined that TMI-1 is in an acceptable material condition and is being effectively maintained by qualified personnel.

The following beneficial practices and accomplishments were noted:

> There is a well-defined program focused on operational planning and preparation for startup, including the startup qualification program.
>
> There is a strong commitment to management self-assessment activities, including the Operations QA Program, the Radiological Assessment Program, and the Off-Shift Tour Program.
>
> Station personnel are well qualified. Their morale, positive attitude, and motivation reflect commitment to improved performance.
>
> There is an overall improvement in station housekeeping.

Improvements were recommended in a number of areas. The following are considered to be among the most important:

> The overall station chemistry program, including coordination between on-site and off-site activities, needs to be strengthened.
>
> There is a need for more first-line supervisory involvement in unlicensed operator and chemistry activities.
>
> The warehouse program for ensuring adequate inventory and quality of spare parts needs to be upgraded.
>
> Increased emphasis is needed on the industry safety program to reduce the number of lost-time accidents."

ATTACHMENT 2

OYSTER CREEK
December 1981 Evaluation

INPO DETERMINATION:

"Within the scope of this evaluation, the team determined that the plant is in an acceptable condition and is being operated in a safe manner by qualified personnel.

Certain beneficial practices and accomplishments were noted:

> The corporate staff has a strong commitment to establish an organization and develop supporting programs to achieve improved support of nuclear operations.
>
> Excellent progress is being made in reducing total exposure and in reducing the number of high radiation areas.

Improvements were recommended in a number of areas. The following are considered to be among the most important:

> Plant management should be more involved in several important areas of plant operation, maintenance, and administration.
>
> Prompt action should be taken to improve industrial safety conditions.
>
> Plant chemistry control needs to be upgraded, particularly in the review of results and trending.
>
> Action is needed to identify many plant deficiencies that are not currently reflected in the work control system.
>
> Enforcement of procedures for radiological control work practices needs improvement.
>
> The generation of solid and liquid radioactive waste is high, and continued efforts in waste reduction are warranted."

OYSTER CREEK
October/November 1982 Evaluation

INPO DETERMINATION:

"Within the scope of this evaluation, the team determined that the Oyster Creek Nuclear Generating Station is being operated in a safe manner by experienced personnel.

The following beneficial practices and accomplishments were noted:

> Strong overall corporate commitment to station improvements.
>
> Increased involvement of senior station managers in the details of plant operation.
>
> Significant improvement in radiological protection practices including reduction of radioactive solid waste.
>
> Improvement in material condition, preservation, and housekeeping in many areas.

A number of areas needing improvement were noted. The following are considered to be among the most important:

> First-line supervisory support of management initiatives, and involvement in on-the-job station activities.
>
> Several areas of training, including initial training and qualification of equipment operators and on-the-job training for most technicians.
>
> Most aspects of plant chemistry.
>
> The quality of plant procedures.
>
> Industrial safety practices.
>
> Off-site engineering support of the station."

ATTACHMENT 3

NUMARC

The Nuclear Utility Management and Human Resources Committee (NUMARC) is a new initiative formed by the nuclear utility industry. NUMARC's goal is to review management and people-related issues in nuclear operations and develop industrywide resolutions. Following is a brief background on NUMARC.

The emphasis in regulation of nuclear power plants has shifted in the past several years from design approval for plants under construction to focus on operating plants—from hardware to non-hardware issues.

This shift of regulatory emphasis has caused concern to the nuclear utility industry. The industry is convinced that such regulatory actions will result in lower standards of performance and undermine the initiatives being taken by the industry.

Because of these concerns, industry leaders determined that a different approach was needed to address these emerging issues. On February 24, 1984, several utility executives met with the NRC Commissioners and staff to present an industry proposal for experience requirements for NTOL plants. At that time, industry representatives asked that NRC delay rulemaking in several areas to allow time for industry to make a comprehensive integrated review of the people-related issues, discuss these issues with the NRC to get their perspective, and to develop industry positions.

On March 7, 1984, a Steering Committee, composed of nine senior utility executives, met to begin work on developing positions and plans for the people-related issues facing the industry.

From this Steering Committee, the initiative was expanded to include senior executives involved in nuclear matters on a daily basis from all U.S. nuclear utilities—the Executive Group. It was also determined that Working Groups would be needed to develop and refine industry positions. Thus, a "pool" of senior nuclear managers was identified from which the Steering Committee can draw people for specific Working Groups.

In order to coordinate NUMARC activities with existing industry organizations, the Steering Committee sought the endorsement of the Utility Nuclear Power Oversight Committee (UNPOC)[*]. In April, UNPOC formally voted to endorse the efforts of NUMARC, including the following NUMARC mission statement:

"The purpose of this electric utility industry initiative (NUMARC) is to conduct an integrated review of management and people-related issues of nuclear power plant operation. These issues will be defined and prioritized, and there will be consultation with NRC commissioners and staff. Industry-originated resolutions will be developed for an issue, with recognition of NRC regulatory needs so that NRC activities are complementary to continuing industry initiatives to assure high levels of safety and reliability in nuclear plant operation. Steps will be taken to assure dissemination, understanding and implementation of resulting industry plans."

The goals set forth by NUMARC are twofold:

- Using a *positive* approach, perform an integrated review of management and people-related issues facing industry; identify problems and root causes; initiate programs or action to solve problems; and to ensure that corrective actions are taken.
- Consider NRC goals in industry initiatives and help NRC avoid inappropriate actions.

NUMARC representatives have emphasized that the nuclear utility industry has made considerable progress since the Three Mile Island accident—from increased staffing levels in the plants to new training facilities, from an INPO-managed accreditation program to an INPO-managed events analysis program.

The nuclear utilities, with their base of experience, knowledge and competence, believe that they are best qualified to identify and prioritize existing problems, determine appropriate solutions and implement corrective actions.

It is recognized that the NRC's principal interest is to protect the public health and safety; however, in many instances, industry does not need additional regulations to accomplish this. Unnecessary rulemaking in areas where industry has initiated actions would be a signal that any further initiatives by industry would likely result in follow-on regulations and would discourage further efforts. NUMARC activities are intended to encourage industry initiatives.

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[*] UNPOC is comprised of board chairmen or other representatives from the following industry organizations: Atomic Industrial Forum, American Nuclear Energy Council, Committee for Energy Awareness, Edison Electric Institute, Electric Power Research Institute, Institute of Nuclear Power Operations, American Public Power Association, National Rural Electric Cooperative Association.

June 1984

Nuclear Utility Management and Human Resources Committee

Utility & Representative

(E) - Executive Group
(W) - Working Group

Alabama Power Company
R. Patrick McDonald (E/W)
Vice President

Arizona Public Service
E. E. Van Brunt (E/W)
Vice President

Arkansas Power & Light
John M. Griffin (E/W)
Vice President

Baltimore Gas & Electric
George V. McGowan (E)
President

Arthur E. Lundvall Jr. (W)
Vice President

Boston Edison
Bill Harrington (E)
Sr. Vice President, Nuclear

A. Lee Oxsen (W)
Director of Nuclear Ops.

Carolina Power & Light
E. E. Utley (E)
Executive Vice President

A. C. Tollison (W)
Manager, Nuclear Train.

Cleveland Electric Ill.
Murray R. Edelman (E/W)
Vice President

Commonwealth Edison
Cordell Reed (E/W)
Vice President

Consolidated Edison
Eugene R. McGrath (E)
Executive Vice President

Charles Jackson (W)
Vice President

Consumers Power
R. B. DeWitt (E/W)
Vice President

Dairyland Power Coop
James W. Taylor (E/W)
Asst. General Manager

Detroit Edison
Charles M. Heidel (E)
President

Wayne H. Jens (W)
Vice President

Duke Power Company
Warren H. Owen (E)
Executive Vice President

H. B. Tucker (W)
Vice President, Nuclear Prod.

Duquesne Light
John Carey (E/W)
Vice President, Nuclear

Florida Power Corp.
Billy L. Griffin (E)
Executive Vice President

Walter S. Wilgus (W)
Vice President

Florida Power & Light
Emil A. Adomat (E)
Executive Vice President

C. O. Woody (W)
Director, Nuclear Gen.

GPU Nuclear Corp.
Philip R. Clark (E)
President

John R. Thorpe (W)
Director, Lic. and Reg. Aff.

Georgia Power Company
James H. Miller Jr. (E)
President

J. T. Beckham (W)
Vice President

Gulf States Utilities
J. Gary Weigand (E/W)
Vice President

Houston Lighting & Power
J. G. Dewease (E/W)
Vice President

Illinois Power
D. P. Hall (E)
Vice President

John Cook (W)
Assistant Plant Manager

Indiana & Michigan Elec.
Milt Alexich (E/W)
Vice President, Nuclear Engineering

Iowa Electric L & P
Sam J. Tuthill (E/W)
Senior Vice President

Kansas Gas & Elec.
G. L. Koester (E)
Vice President, Nuclear

Warren L. Mutz (W)
Manager, Nuclear Ops. Support

Long Island Lighting
M. S. Pollock (E)
Vice President, Nuclear

R. A. Kubinak (W)
Manager, Nuclear Ops. Support

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Roth S. Leddick (E)
Senior Vice President

Maine Yankee
John B. Randazza (W)
Executive Vice President

Mississippi Power & Light
Jack B. Richard (E/W)
Senior Vice President

Nebraska Public Power
Larry G. Kuncl (E)
Assistant General Manager

Jay M. Pilant (W)
Manager, Technical Staff

New York Power Authority
J. P. Bayne (E)
Executive Vice President

H. A. Glovier (W)
Senior Manager

Niagara Mohawk
Gerald K. Rhode (E)
Senior Vice President

T. E. Lempges (W)
Vice President, Nuclear Gen.

Northeast Utilities
E. J. Ferland (E)
President

W. G. Counsil (W)
Senior Vice President

Northern States Power
Dennis E. Gilberts (E)
Senior Vice President, Power Supply

Charles E. Larson (W)
Director, Nuclear Power

Omaha Public Power
W. E. Miller (E)
Assistant General Manager

Richard L. Andrews (W)
Division Manager — Pub. Rel.

Pacific Gas & Elec.
G. A. Maneatis (E)
Executive Vice President

J. O. Schuyler (W)
Vice President

Pennsylvania Power & Lt.
John T. Kauffman (E)
Exec. Vice President — Operations

Bruce D. Kenyon (W)
Vice President

Philadelphia Elec.
Shields L. Daltroff (E/W)
Vice President

Portland General Elec.
William J. Lindblad (E)
President

Bart D. Withers (W)
Vice President

Public Serv. of Colorado
Oscar R. Lee (E/W)
Vice President

Pub. Serv. of New Hampshire
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Vice President, Nuclear Production

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Senior Vice President

R. A. Uderitz (W)
Vice President; Nuclear

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John E. Maier (E/W)
Senior Vice President

Sacramento Municipal
John J. Mattimoe (E)
General Manager

R. J. Rodriquez (W)
Executive Director, Nuclear

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O. W. Dixon Jr. (E/W)
Vice President, Nuclear

Southern California Ed.
David J. Fogarty (E)
Executive Vice President

Kenneth P. Baskin (W)
Vice President
Nuclear Engineering,
Safety and Licensing

TVA
J. A. Coffey (E)
Director, Nuclear Power

H. L. Abercrombie (W)
Asst. to the Director
Division of Nuclear Power

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Executive Vice President

B. R. Clements (W)
Vice President

Toledo Edison
Dick Crouse (E/W)
Vice President, Nuclear

Union Electric
Earl K. Dille (E)
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Donald F. Schnell (W)
Vice President

Vermont Yankee
Wiliam F. Conway (E)
President

Warren P. Murphy (W)
Vice President, Operations

Virginia Electric & Pwr.
Jack H. Ferguson (E)
Executive Vice President

W. L. Stewart (W)
Vice President

Washington Public Pwr.
D. W. Mazur (E)
Managing Director

Jack W. Shannon (W)
Director, Power Gen.

Wisconsin Electric
Sol Burstein (E)
Executive Vice President

Carlyle W. Fay (W)
Vice President

Wisconsin Public Serv.
Carl W. Giesler (E/W)
Vice President

Yankee Atomic
L. H. Heider (E/W)
Vice President & Manager,
Nuclear Operations

Steering Committee:
James H. Miller Jr., Chairman
  Georgia Power
Warren H. Owen, Vice-Chairman
  Duke Power Company
R. Patrick McDonald
  Alabama Power Company
George V. McGowan
  Baltimore Gas and Electric Company
Cordell Reed
  Commonwealth Edison
Eugene R. McGrath
  Consolidated Edison Company
E. J. Ferland
  Northeast Utilities
Shields L. Daltroff
  Philadelphia Electric Company
William J. Lindblad
  Portland General Electric Company
J. A. Coffey
  Tennessee Valley Authority

ATTACHMENT 4

EXCERPT FROM PRESENTATION TO THE NRC COMMISSIONERS
BY MR. JAMES MILLER, PRESIDENT,
GEORGIA POWER COMPANY AND CHAIRMAN OF NUMARC
June 22, 1984

SELF-INITIATED INDUSTRY IMPROVEMENTS (LAST FIVE YEARS)

- The number of full-time utility training personnel per plant has increased by 376% and those who hold or have held NRC licenses has increased by 182%.

- The percentage of plants having formal training and certification for their technical instructors has more than doubled.

- Since 1979, the number of full-scope control room simulators in operation or planned has increased from 10 to 69.

- The addition of simulators and other training facilities has resulted in a 252% increase in space dedicated to training.

- The number of permanent engineering personnel per plant supporting plant operations has increased by 82% since 1979.

- Between 1979 and 1984, the percentage of plants with formal fitness for duty programs increased from 55% to 84%.

- Since 1979, the number of NRC-licensed shift operators (Reactor Operators (ROs) and Senior Reactor Operators (SROs) per operating plant has increased by 36%, and the number of NRC-licensed staff members per plant (other than shift operators) has increased by 102%.

- The total space in plant maintenance shops has increased by 68%.

- Major progress has been made in reducing radiation exposure as follows:

    - The total man-rem of exposure per operating reactor has been reduced by more than 10% from its peak (in 1980 for BWR's and 1981 for PWRs), even though much exposure-intensive modification work has been and is being done.

    - The number of workers exceeding 5 rem of exposure has decreased by more than 70% since 1980, and in 1983 only one person out of the tens of thousands in the nuclear industry exceeded the regulatory exposure limit of 3 rem per quarter at an operating reactor; that exposure was 3.059 rem.

- Between 1980 and 1983, the average number of unplanned reactor trips per year for commercial operating unit while synchronized to the grid was reduced from six to four.

- Lost time accidents have been reduced by almost 75% since 1979.

In addition to these self-initiated improvements, on April 9, 1984 we made commitments to initiate improvements in four additional areas:

- As an industry, we committed to exert best efforts to have all applicable training programs ready for accreditation by the end of 1986 or within two years after plant startup.

- As an industry, we committed to enhance INPO's Corporate Assistance Program to include corporate evaluations and to send utility executives and senior managers on those evaluation trips. This enhanced program will begin later this year.

- As an industry, we committed to provide SROs to assist with INPO plant evaluations; utilities have begun to identify SROs for this program; INPO has conducted pilot evaluations using utility SROs and has scheduled training for all SROs during August. SROs will begin routinely participating in evaluations in September 1984.

- As an industry, we committed to have INPO visit each Near Term Operating License (NTOL) plant and corporate office to assess and enhance the staff's readiness to operate their plant. INPO will begin this activity later this year.

ATTACHMENT 5

GPU Nuclear

GPU Nuclear Corporation
100 Interpace Parkway
Parsippany, New Jersey 07054
201 263-6500
TELEX 136-482
Writer's Direct Dial Number:

July 2, 1984

Dr. B. J. Snyder
Program Director
TMI Program Office
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Dr. Snyder:

Director TMI-2's letter of May 22, provided a short-term schedule for TMI-2 Cleanup activities, and advised you that we would provide in June a schedule for the longer term.

As you know, GPU Nuclear has spent considerable effort over the past several months to gain a better understanding of the total task of cleanup of TMI-2, and of the methods and schedule for that task. From this effort we have established as our next major objective the removal and shipment offsite of nuclear fuel to the point that criticality is no longer a technically reasonable event. That objective encompasses not only the fuel in the core region, but also that which has been relocated by the accident to other portions of the reactor vessel and to plant systems. It would result in removal of the great majority of the remaining radioactivity from the site. We believe this is a significant milestone which would further reduce the remaining potential risk to the public from TMI-2. The TMI-2 Safety Advisory Board comments on that risk in its May 1984 Annual Report as follows:

> "The members of SAB are unanimous in their opinion that TMI-2 does not currently pose a significant risk to public or worker health and safety."

Further, we have embarked on an accelerated plan for reaching that milestone, on a time scale which is constrained by what we consider to be reasonable and prudent care. Further reduction in the alloted time periods would, we believe, be counter-productive in personnel exposure and in the safety of the work.

We have developed a schedule for those portions of the work for which our knowledge of the actual conditions to be dealt with has been reasonably developed. We also have set target dates for other portions of the plan. These target dates are expected to be useful in focusing attention and effort on resolving the major uncertainties in the remainder of the required work. Our schedule calls for:

-Locate significant quantities of fuel no longer in the core region -- December, 1984.

-Commence fuel removal -- 1 July, 1985.

Target dates have been set as follows:
- Complete fuel removal from the original reactor volume -- third quarter 1986.
- Complete removal of all fuel in the reactor vessel -- second quarter 1987.
- Complete removal of fuel from the reactor plant systems -- third quarter 1987.

These schedules and target dates are based on the presently available incomplete information on the condition of the damaged reactor and plant, and on our expectation of reasonable success in carrying out the research and development necessary to the conduct of this unprecedented project. We have also assumed and will need continuing and timely participation by the NRC in doing its part to permit the program to go forward as planned.

As you know, there is an important question as to the appropriate definition of when the cleanup project is complete; in particular, whether for reasons of reduction in total personnel dose, work should be terminated after the fuel is removed and remaining radioactivity effectively stabilized. This would of course result in de facto long term storage of the remaining radioactivity at the site. Commission action on decommissioning criteria is expected to be helpful in reaching a sound decision on this complex matter. Fortunately, as far as project planning is concerned, the decision is not needed now. However, because of this uncertainty, we are not able now to provide a schedule for activities beyond 1987. A firm decision of the proper end point could, we expect, be made in about two years.

In view of the major uncertainties regarding the specific work to be done, we believe our efforts are best directed to making progress on the defined work and obtaining information as needed to define the currently undefined work. Efforts to develop detailed plans and schedules now for the later, undefined work are not particularly useful.

Our objective is to achieve the end point of the 1982 Project estimate in terms of cost and completion date by recovering the time lost during the last year. We currently have no information which would show this cannot be done.

In closing, let me assure you that we intend to go forward with the cleanup as rapidly as possible commensurate with the required care for the safety of the public and our personnel.

P.R. Clark

P.R.Clark
President

PRC/mak
cc: TMIPO-TMI-2, P. Grant

ATTACHMENT 6

The Intervenors' Intervenor

Taking GAP's Measure

The Government Accountability Project, Aided By Tolerant Intervention Rules, Works To Bring Licensing To Standstill

The tactic of introducing last-minute allegations in order to delay the licensing of a nearly completed reactor, while not a new practice among anti-nuclear activists, has been elevated to a near art form by a group relatively new to the movement, the Government Accountability Project. This organization, known simply as GAP, claims among its victories the halting of Cincinnati Gas & Electric Co.'s Zimmer project, the addition of weeks of costly delay in the licensing of the first unit of Pacific Gas & Electric Co.'s Diablo Canyon facility, and a month's delay in the startup of Commonwealth Edison Co.'s LaSalle plant at a cost to the utility's consumers of nearly $10 million.

In nearly a dozen proceedings since its first appearance in the Zimmer action in 1980, GAP has added embellishments to what had become routine and increasingly non-productive intervention tactics.

Some of these include: the broad-based search for and the highly dramatized presentation of testimony from whistleblowers claiming poor and even dangerous work practices; forcing the Nuclear Regulatory Commission into the time-consuming reinvestigation of major portions of completed work; and the skillful use of the news media for treating the rehash of frequently old and discredited allegations as startling new discoveries which, if true, would pose threats to the lives of private citizens and place in doubt the viability of multi-billion dollar utility investments.

Cause for Concern

Every utility with a plant soon to come on line feels justified in fearing GAP because these tactics have worked. So far as actual delays are concerned, however, they work only sometimes. More often than not, GAP achieves no delay at all, and must settle instead for the satisfaction of having fed the fires of mistrust in nuclear energy and in the competence of the management of that utility targeted for attack.

On the one hand, given the origins of the organization, it is possible to conclude that this apparently secondary end has been, in reality, the prime objective from the beginning of GAP's first effort. According to this theory—consistently denied by the group—while the utilities, the NRC and the news media debate loudly the issues of safety and incompetence which GAP raises, they are in fact playing straight into the group's hands because its real objective is to halt the entire nuclear industry, and the simple airing in public of the allegations raised contributes to this end.

On the other hand, given the present economic climate and the potential effect of even a brief delay of a reactor's startup on a utility's financial standing, the applicant for an NRC license cannot afford the luxury of debating the theoretical issue of GAP's possibly concealed motives. Because of those rules governing intervention in the licensing process now in force, if GAP wants to raise allegations of mismanagement and threats to public safety, no matter how specious, the utility must disprove these charges if it wants to get its reactor on line. It must, in short, play GAP's game according to GAP's rules.

To do this with any degree of effectiveness, according to those who have weathered GAP attacks, utilities must understand what GAP is, how it works, and how some utilities have managed to deal with it successfully.

The best starting point when attempting to understand GAP is with its founding organization, the Institute for Policy Studies.

The IPS was created as a center for "radical scholarship" by two middle echelon officials of the Kennedy Administration—one from the staff of the National Security Council and the other from the U.S. Arms Control and Disarmament Agency. They shared a dissatisfaction with the Administration's military and foreign policies, and sought to create what has been referred to as "the think tank of the Left" to offset what they felt was the excessive influence of moderate and conservative groups on policy making.

From the beginning, its stated policy has been to effect change in existing systems. The governmental structure had become, in the words of an early IPS report, unresponsive to public needs and a servant to institutional interests because "fresh political ideas and moral truths were smothered in the bureaucratic process."

With funding primarily from major foundations, the IPS has over two decades involved itself with the support of such domestic causes as labor, civil rights, anti-war activities, women's rights and neighborhood and community movements. Its international arm, the Transnational Institute, attacks mainly multinational corporations, but is deeply involved as well with the support of the more radical Third World government philosophies.

Activism at IPS is carried out on a $1.6 million annual budget and is organized within three major programs: National Security and Foreign Policy; Domestic Reconstruction; and International Economics and Human Rights.

Early GAP Targets Were Government Agencies

Until February of this year, the Government Accountability Project was one of six sections making up the IPS Domestic Reconstruction Program. This winter, however, GAP disassociated itself from the group to the extent that it undertook independent funding and set up a separate administrative structure. Its offices remain in one of the two IPS buildings located in northwest Washington, and it retains what one IPS official calls "comradely ties."

According to the IPS annual report for 1983 issued in April, "GAP works to protect the public from corporate and government abuse, fraud, and health and safety hazards by legally defending 'whistleblower' employees who expose such practices."

GAP was launched in the early 1970s when it was known as the Project on Official Illegality, which was founded by IPS specifically to assist whistleblowers from national security agencies such as the CIA. In 1977 it was given its present name and expanded in scope to support all government workers who spoke out against their agencies.

According to its official description, GAP exists to monitor "the legal framework for personal accountability in government." This is supplemented "by a clinical program undertaken with law students from the Antioch Law School which provides counseling, verification studies and legal casework for the persons who chose to blow the whistle on wrong-doing, waste or fraud in government."

GAP's first clients were government workers, and they were defended against a formidable enemy. A 1977 GAP document states: "Every day there are Federal employees faced with the dilemma of doing their jobs—or following instructions to break the law or overlook waste. They are rarely rewarded. Often they face the threat of penalty. Federal employees who speak to a supervisor, testify before a congressional committee, or write to a newspaper, often risk sacrificing their careers."

In 1980, GAP was approached by Thomas Applegate, a private investigator once retained by Cincinnati Gas & Electric Co. to check into rumors of time-card cheating by workers at the Zimmer reactor project. In the course of his work he found much more than time-card cheating, he was later to tell the NRC. Among the numerous problems he uncovered were reports by workers of faulty welds on some of the prefabricated piping.

The NRC investigated the allegations and issued a report in mid-1980 that confirmed only the discovery of a technical violation. Applegate turned to GAP, which debated whether or not to get involved because, according to GAP's executive director Louis Clark, "it was a corporate case," and outside of the group's area of expertise.

Initial Zimmer Action

The decision was made to represent Applegate, and GAP prepared on his behalf a disclosure report to the Office of the Special Counsel of the Federal Merit Systems Protection Board charging, among other things, that the initial NRC investigation into Zimmer represented violations of Federal law, abuse of authority, mismanagement, and the perpetuation of "gross waste and a substantial and specific danger to public health and safety."

This was quite an expansion on what had originally been limited to some faulty welds. With GAP's help, however, Applegate had received so much attention from the local media through press conferences and private interviews that other whistleblowers were going either to GAP or to local anti-nuclear groups with their own allegations of unacceptable work at Zimmer. In time the number totalled nearly 75.

In late December of 1980, the Office of the Special Counsel ordered the then-NRC Acting Chairman John Ahearne to investigate the GAP charges. In response to the order, the Commission launched two probes—one of its initial investigation, and the other a broad-scale check of quality assurance matters at Zimmer.

Work on the plant continued in spite of the cascade of allegations being aired. The plant was said by CG&E to be 97 percent complete by November 1982 when the NRC ordered a halt to all safety-related construction, pending completion of an independent review of CG&E's management of the project.

Contracted for that review was the GA Technologies Inc. subsidiary, Torrey Pines Technology. It reported back that flawed management procedures, which could be documented as early as 1974, placed in doubt the quality of large segments of construction. A consultant brought in to evaluate that report, Bechtel Power Corp., raised the estimated cost for completing the project to $3.1 billion. In mid-January of this year, CG&E halted all construction and announced it would consider completing the unit as a coal-fired unit.

Impact Assessed

GAP, which went from representing Applegate to acting as counsel for the lead anti-nuclear group which had been opposing Zimmer for years, takes credit for halting the nearly completed project. Even its critics allow that this is partially correct.

A member of an area business coalition formed to combat the antinuclear press which GAP had generated throughout the debate complains that "the media was continually against us. We could hardly ever get our words printed. We struggled hard, but the noise was so loud it was never possible to get anything affirmative on the record.

"GAP was very instrumental in creating this atmosphere. There were only one or two (whistleblowers) who had testimony or allegations which could be documented. And that was real old testimony about matters that CG&E had cleared up a long time before.

"I think they were so successful at Zimmer because the management was a little inept at handling them. They took the view that there was little they could say because, after all, the NRC was the judge, they were the jury, they were the whole thing, so there was nobody they could really testify to. They were overly cautious in handling this."

Another member of the coalition concedes: "I think GAP deserves the credit to the extent that they supplied the pressure to keep the thing going."

More often than not, GAP achieves no delay at all, and must settle instead for the satisfaction of having fed the fires of mistrust in nuclear energy.

GAP, which initially was hesitant to enter the Zimmer issue, was quick to realize it had the formula for handling other reactor cases, and was eager to put it to work. Others realized this as well. Long before Zimmer was dropped, GAP had been approached by whistleblowers and intervenor groups from 30 other reactor projects who wanted the organization to represent them. Out of necessity, it must be selective.

According to the IPS annual report for 1983, GAP's staff is limited to "three full-time lawyers and a community organizer." They are assisted by up to 15 law school interns as well as volunteer office help. They also have the services of one full-time private attorney.

Their primitive working conditions were spoken of proudly by executive director Clark in a letter to the editor of the Midland (Mich.) Daily News. "Our offices in Washington are furnished with second-hand desks and cardboard box file cabinets."

The group, he insists with regularity, is not anti-nuclear, rather it is opposed to corruption in government. GAP is presently involved in more than forty cases, and well less than half are related to nuclear projects.

In a late 1983 interview, Clark spoke of a concern that reactor cases might come to take too great a share of GAP's time and cause it to lose sight of its mission. "There does come a point where you have to worry about whether a particular type of case is coming to dominate the program. We haven't reached that with nuclear yet, but I would say that we are coming to that point where we'll probably draw the line—possibly—it's really a group decision, and no one of us should state his own personal opinion."

The group's one community organizer, Billie Garde, in an interview in mid-May, saw no possibility of the discontinuation of nuclear work out of any sense of fairness to other potential clients that might need GAP's representation. There is only the challenge of selecting the next cases wisely. This process is well established, she said.

"First, there is the GAP preliminary investigation" of a request for representation, "and it needs to meet a certain standard to get that far. Then, it may or may not go into full-scale investigation." At this point, a single issue may emerge which GAP will elect to pursue and then the case is dropped. But "if it becomes a full scale investigation, then it just stays that way almost forever. I mean, GAP never really closes cases."

Garde was asked if, in support of its claim that it was not anti-nuclear, whether GAP has ever considered requests from whistleblowers at any other types of power plant projects. "Oh, no," she replied. "We've never gotten one of those. Why would anyone want to complain about a power plant that wasn't nuclear?"

But wasn't it possible, the interviewer continued, that some other plants, coal for example, might contain at least some of the construction flaws that GAP clients regularly attribute to reactors? "But there isn't any code of regulations governing the building of coal-fired plants," Garde said. "And there's no safety hazard."

Basic GAP Methodology Adapted To Each Target

The list of reactor projects targeted by GAP is certain to grow, according to Garde. While she would not name specific plants, she stated that "there's one in (NRC) Region I, one in Region II, more in Region IV, and one more in Region V that are possibles. We're reading the documents and having people evaluate the issues."

In the event that one or more of these are selected by the group for action, the utilities to be involved can reasonably expect that GAP will move according to a scenario that has become fairly standardized in its applications to date. To explain this scenario, and the predictable tactics used, GAP's intervention at one plant said to be in the "preliminary investigation stage"—Louisiana Power & Light Co.'s Waterford-3—and one meriting GAP's "full investigation stage"—Duke Power Co.'s Catawba Unit 1—are examined here in detail.

Atomic Safety & Licensing Board hearings on LP&L's request for a low power operating license for Waterford-3 were held over three months in early 1982. Outstanding items cited as needing action prior to licensing included perceived staffing and management inadequacies, reservations concerning the unit's Combustion Engineering System-80 rapid depressurization capabilities, and a list of what the utility regarded as readily correctable technical matters. No major obstacles were seen interfering with the present fuel loading target of late May or early June of this year.

Local intervenor groups alleged that improperly poured concrete on the nuclear island posed a safety threat, but this charge was discredited in separate investigations completed in late 1983 by the regional NRC office and a team of private consultants retained by LP&L.

In March of this year, a representative of the lead intervenor group opposing startup of Waterford-3, Citizens for Safe Energy (CSE), appeared before local environmental groups soliciting contributions that would permit it to retain GAP to aid in the fight aginst licensing. The sum needed was $5,000.

Apparently it was raised. On April 11, GAP staged a press conference on the third floor of the New Orleans Public Library to announce "a preliminary investigation into worker allegations of a Quality Assurance Breakdown at the Waterford-3 Nuclear Power Plant."

While only a month before, local activists were seeking the funding to assure GAP's involvement, the news release handed out at the press conference stated that the announcement "follows a six-month review by the GAP legal investigative staff of inadequate oversight by the regional office of the Nuclear Regulatory Commission and recent worker disclosures about significant problems—including altered and missing documentation, a cracked foundation, and questionable hardware."

In a separate handout, GAP was more specific about its allegations of a QA breakdown on the part of regional NRC inspectors.

"In its approach to whistleblowers, Region IV has:

"1. Violated the confidentiality of whistleblowers, either directly or indirectly;

"2. Narrowly defined issues raised by whistleblowers and failed to inspect beyond hardware examples the witness was able to specifically identify;

"3. Failed to record interviews or take affidavits, particularly on the most significant issues being raised by whistleblowers;

"4. Failed to include affidavits in the public reports when the statements contradicted the NRC's party line on the problems at nuclear plants;

"5. Failed to keep pace with new whistleblower allegations in a timely manner."

GAP also geared its pitch to the hazards of radiation. "An accident at Waterford III could kill as many as 105,000 people, with 270,000 people injured, and cost over $131 billion in damage."

A total of thirteen "specific problems and allegations" were listed in GAP handouts, but missing were details of the source of the allegations or mention of whether these matters had been already addressed by the NRC and LP&L. Rather, there was a pitch to the press to play its GAP-envisioned role correctly. "Once again it has been the fourth estate that has had to bring forward violations and deficiencies at nuclear plant construction projects—enlightening the public in this area to problems the NRC was unable or unwilling to deal with."

The press responded with first day articles headlined "Washington Group Probes Waterford 3" and "Group to Investigate La. N-Plant Construction," but interest waned after that.

An LP&L spokesman feared worse. "In answers to questions Garde would not say that she thought the plant should be shut down because the facts weren't in yet, but then in the next minute she would turn right around and say that she thought it should be shut down. But, anyway, there's been nothing since then. We have not heard a peep."

Garde told Nuclear Industry, however, that GAP's involvement at Waterford-3 "will go to full scale." CSE had failed to get the hearings reopened "because they didn't have the right procedural setup and they just didn't have very articulate arguments."

Just how and when GAP will act depends on the actions taken by a special NRC team to aid Region IV in investigating some 39 allegations raised last year by CSE. Said Garde, "I think that our position at Waterford will become much more crystallized when the task force issues its report. If they disclose what we know is out there, then there isn't a real need for us to be on the front line. If they find it out and report it, that's great. If they find it and don't report it, then it's a whole 'nother ball game."

Actions at Catawba

The lack of specifics suggests that GAP entered Waterford with no allegations other than those raised last year by local groups. Escalation to a "full investigation stage" will occur, if it comes at all, when the group elects to make an issue out of one or more allegations it feels have been dismissed too readily by the special NRC team. An idea of what LP&L can expect in that event is contained in the record of Duke Power Co.'s experience in its efforts to license the first unit of its Catawba facility.

> *". . . and it has been the fourth estate that has had to bring forward violations and deficiencies at nuclear plant construction projects." (from GAP press release)*

A group known as the Palmetto Alliance for years has acted as lead intervenor in opposing the licensing of the Catawba Nuclear Station. Just before the ASLB hearings on Duke's request for an operating license were to begin in early October last year, GAP, which had agreed to assist the group, fired its opening shot. This was in the form of a 46-page petition filed with the NRC asking the Commission to require a 100 percent reinspection of welds at both Catawba units by an independent contractor.

The petition also requested that "the Commissioners direct the Office of Investigations (OI) to conduct a complete and thorough investigation into the deliberate mishandling by Duke Power Co. management of certain serious complaints by Catawba welding inspectors to determine possible violations of 10 CFR Part 21, 10 CFR Part 19, and the Department of Labor provisions 29 CFR Parts 24 and 210 which prohibit licensees from harassing, intimidating, or in any other way discriminating against nuclear employees for revealing construction problems which they believe may lead to safety problems."

Four months prior to the filing of that petition, GAP signaled what was coming in an affidavit submitted by Billie Garde announcing that the group had been investigating conditions at Catawba since March 1982 when it agreed to support the Palmetto Alliance. Based on its fourteen-month probe, Garde said GAP had "determined that, (1) there has been a significant breakdown in the QA/QC program implementation at the Catawba plant, and (2) the NRC Regional Inspection and Enforcement (I&E) staff failed to take the required appropriate action to determine the extent of the quality assurance breakdown at the Catawba facility."

There were, in both documents, frequent references to the existence of a significant body of whistleblowers anxious to detail evidence proving allegations of the breakdown in quality assurance. Absent, however, was any reference to the total number of whistleblowers or their specific allegations. It turned out that there were only six willing to come forward and that their charges, to the extent they have been made public, were largely previously resolved issues.

The NRC was to grant the GAP petition for both the OI and the I&E investigations, as well as a third request, this one for an Office of Inspector and Auditor (OIA) probe into whether regional NRC inspectors improperly turned over draft review documents to Duke personnel, thus compromising the confidentiality of whistleblowers who complained to the Commission. All three were underway by the end of the first month of the ASLB hearings.

The introduction of whistleblowers to the hearings themselves proved difficult for GAP. Their noticeable absence in the first two weeks of proceedings resulted in a board offer to let current and former workers at Catawba testify *in camera*, or behind closed doors. The offer, eventually accepted by GAP, included permitting utility lawyers to attend these sessions, but they would be sworn to secrecy in order to protect the workers.

The first whistleblower to be produced by GAP charged that welding inspectors cheated on certification exams, and that workers were advised in advance as to which welds would be examined by NRC inspectors. Initially the allegation was delivered to the board at an informal public hearing. It was not made under oath and was presented without supporting documentation.

It wasn't much in support of GAP charges of wholesale corruption and mismanagement which had resulted in the launch of three separate investigations, so the witness was produced again in the sixth week of hearings to repeat his allegation under oath, thus permitting Duke counsel to offer evidence in refutation of the bad welding charge.

The following week, two former workers testified that in 1978 rain water flooded what was to be the control room, and in 1979 flooded the room built to house the plant's emergency diesel generators. Both workers were members of the Palmetto Alliance.

Early in the third month of the hearings, the ASLB took the testimony of three witnesses produced by GAP who were willing to appear only *in camera*. Their reluctance, and the absence of any other witnesses, was ascribed by GAP to the utility's ability to intimidate its workers into silence.

The day after his secret testimony, however, one of the three appeared on a Charlotte, N.C. television program, his image and voice distorted, and claimed that the containment wall at Catawba was "slap full of laminations. This is faulty steel."

A month later he appeared again at a GAP press conference in Washington to repeat his claim. By this time, however, the ASLB hearings were nearly over. Rejected were last minute GAP motions to keep the proceedings going until the OI investigation was complete, and to reopen the right to obtain information on those safety issues raised by whistleblowers who had testified *in camera*.

For all of their charges of substance, GAP had produced only shadow. But it did win the three separate NRC investigations, and the media coverage of the whistleblowers that did materialize had a measurable impact on local attitudes towards the plant.

Asked to assess GAP's impact on the licensing proceedings, Duke spokeswoman Mary Cartwright explained: "They definitely got us some negative press. They were able to stir up things far better than the local groups had been able to do for some years now.

"When GAP came in, the local media got very excited. A Washington group (was) announcing a serious challenge—and the name, Government Accountability Project made

GAP is not insensitive to criticism. Illustrating this fact is the following letter sent in April 1983 by the group's executive director to the head of a Cincinnati area group organized at the peak of the debate over completion of the Zimmer plant in an effort to provide information countering that disseminated by GAP to the media.

Mr. Robert Acomb
President
Energy Ratepayers United, Inc.
1045 W. 18th St.
Cincinnati, Ohio 45203

Dear Mr. Acomb:

It has come to my attention that you have helped found an organization whose stated goals, at least in part, are not dissimilar to our own. At least I have been given to understand that you want the Zimmer Nuclear Power Station to operate safely.

Unfortunately, your increasing attacks on the Government Accountability Project and the Institute for Policy Studies are not an appropriate or effective way to achieve your stated objectives. Rather, these attacks are a counterproductive distraction, in addition to being inaccurate and defamatory.

The Government Accountability Project has no hidden agendas, despite your suggestion otherwise. We are proud of our reputation. We have provided legal services and other assistance to over one hundred individuals who were in the uncomfortable position of having to choose between the truth and their careers. Our free legal assistance was given to these people without regard to their political persuasion or the politics of those responsible for alleged wrongdoing.

In the situation at Zimmer courageous workers have exposed momentous problems. The validity of their revelations will be no less real, despite any statements you might make about our motivations or associates. By continuing to defame GAP, you will only threaten your own credibility, and the sincerity of your stated goal to see that problems at Zimmer are fixed.

Of course, you have to run your new organization as you see fit. And if that means carrying on a campaign that at least in part merely distracts the Cincinnati public, then that is your choice and your responsibility.

For my part, I forward to you two responses that we have prepared to answer two of the type of articles upon which you seem to be relying. Those articles . . . were both malicious in intent and inaccurate in description. Given notice of the truth, I trust you will choose not to continue in this self destructive course.

Yours truly,
Louis Clark
Executive Director

it sound like a credible group. In our community surveys, when we ask if there is anything that has ever given . . . cause for concern about nuclear energy and Catawba, we find a number of people say 'yes, welding, former worker allegations,' all of that. So the community is aware of them. I'm not sure if Palmetto . . . could ever have gotten that level of awareness."

Cartwright stressed GAP's effectiveness "in using the media." This was particularly evident with "the whistleblower who came out of the camera. They got him at the local station with the light behind him and the distorted voice making all of his charges.

"The fact that the charges didn't hold water was irrelevant to the media. They put this guy on the air and they wouldn't give us any of the details, so at the time we had to answer generally. But that couldn't offset the sense of drama that had been created."

Is GAP finished with Catawba? No, not according to Garde. According to her sources at the NRC, two of the three investigations requested at the outset of the ASLB hearings have been decided in GAP's favor and their announcement is expected soon. Still pending is the I&E probe of the alleged breakdown in quality assurance at Catawba. If the findings in that probe are not acceptable to the group, said Garde, "I anticipate we'll go to court."

In this event, the entire protracted ASLB hearings would become nothing more than theater so far as the ultimate outcome is concerned.

Duke, meanwhile, anticipates fuel loading at Catawba by mid-June.

By the Hundreds

Variations on the tactics applied by GAP at Waterford and Catawba have been applied at all other reactor projects with which the group has elected to become involved. Vying with Zimmer for having attracted the most national attention is GAP's actions on behalf of intervenors at Pacific Gas & Electric Co.'s Diablo Canyon.

Here it was not necessary to go to extremes in the search for whistleblowers, or to call reactor site workers at their homes in an effort to come up with enough allegations to make announcements at press conferences appear valid. Intervenors at Diablo Canyon had been attracting attention for years, and had been amassing allegations as well. There were approximately 170 shortly after GAP came on the scene. After that, the count topped 500. They would come in in batches of 100 or more.

In early March, in a response to questions from the Atomic Safety and Licensing Appeal Board, PG&E attorneys protested that "the only thing 'new' about these allegations is that they were cleverly packaged by . . . the intervenor's new set of lawyers (GAP) and then paraded before the media and Nuclear Regulatory Commission. Admittedly, the documents are 'new,' i.e., they are dated from November 1983 to the present, but the information on which they are based is not. Since all of the 'new information' was available to intervenors during discovery conducted in (licensing) hearings, they should not be allowed to manipulate the administrative process by trotting out through a new set of attorneys their 'new information' to augment/reopen the record. This manipulation, if allowed, will effectively obstruct the NRC administrative process.

"In effect, intervenors will be permitted to lay back until the eve of completion of the hearing process and then spring 'new information' on a tribunal and demand that hearings be resumed to consider this information."

PG&E's statement was in fact a description of the GAP tactics as applied at Diablo Canyon. And the tactics worked for another month after that protest was delivered to the ASLAB. Less than a month before, Thomas Devine, GAP's legal director, conceded to the NRC that as of that date, Feb. 10, GAP had spoken to 30 current or former employees at Diablo Canyon and had taken only eight affidavits. He added, "although we do not have all the details, our preliminary conclusions are clear: in terms of quality assurance, Diablo Canyon equals the worst lemons in the nuclear industry."

Devine seemed to be admitting that GAP was shooting from the hip. The NRC was powerless to stop it. In the case of Diablo Canyon, the low-power permit was finally restored on April 13. In mid-May, however, GAP was alluding to new witnesses, new allegations and new efforts to reverse this decision.

NRC's Slow Response To Industry Call For Change

The NRC is at the mercy of any qualified intervenor electing to offer the Commission last minute allegations in an effort to slow or halt a licensing action because of its broad-based interpretation of the regulation governing intervention, 10 CFR 2.714. It states: "Any person whose interest may be affected by a proceeding and who desires to participate as a party shall file a written petition for lease to intervene."

GAP has entered most of the nuclear cases in which it is involved as the legal representative of an already accredited intervenor in the case, thus eliminating the need to undergo even this relatively simple process.

Once involved, the group makes maximum use of NRC's equally broad-based interpretation of what constitutes an allegation. A Commission report on regional procedures for screening allegations states that "Allegations, complaints and concerns [referred to as allegations] pertaining to NRC licensed facilities and activities may be received by telephone, letter, news media reports or by direct verbal contact at sites, in offices, at meetings, and even at social functions. It is imperative that allegations be recognized as such by staff members, and processed professionally, promptly and uniformly.

"An employee who receives an allegation must be aware that it is essential to protect the identity of an individual making an allegation to preclude the inadvertant or premature disclosure of the individual's identity outside NRC. To this end, coordination with the appropriate Investigation/Allegation Coordinator, is necessary. This protection of an individual's identity is not to be confused with the principle of 'confidentiality.'"

"The only thing 'new' about these allegations is that they were cleverly packaged by the intervenors' new set of lawyers and then paraded before the media and NRC."

The argument is raised that this policy creates a situation which encourages making frivolous allegations because it places no burden on the person making the charge to supply any proof. Credibility and accuracy are not at issue. No one making a false allegation faces any risk whatsoever.

No one would responsibly suggest that NRC place curbs on its process for accepting and investigating valid allegations, but a case is frequently made by those in industry that the Commission reconsider just what is the proper forum for their review. Barton Z. Cowan, an attorney with the firm of Eckert, Seamans, Cherin & Mellott, and chairman of the Atomic Industrial Forum's Lawyers Committee, addressed this issue in early May at an AIF briefing of the NRC on the state of the industry.

Said Cowan: "There is no question in our mind that when the Commission is faced with last-minute charges, it must look at those charges and must determine whether there is any substance to them before it can permit the plant to go forward with licensing. The question is not whether the Commission should look at those charges. The question to me is how those questions should be looked at."

Cowan suggested that allegations be processed by the staff before being allowed in ASLB proceedings. "We believe the appropriate place for resolution of last-minute quality assurance charges, indeed the appropriate place for thorough review of all quality assurance charges, is with the Commission staff. Unfortunately, there is a current perception by the licensing boards and the appeal board that they must be the final arbitor of each claimed error and each charge of quality assurance inadequacy. It has destabilized the licensing process, and it has made it very difficult to close out those hearings."

Called for by Cowan was an NRC policy setting a threshold for admission of last-minute charges. "As a minimum, the threshold should require confirming documentation, affidavits based on personal knowledge, other direct evidence and a statement of the safety significance with respect to the alleged . . . deficiency."

The lengths to which the NRC now goes to protect the identity of a whistleblower, Cowan said, "has led to the unusual circumstance of the applicant, who is building the plant, not knowing of the (alleged) deficiencies; and therefore, not knowing how to respond to them. The sanctity of the investigation process has been placed, in our judgment, above the legitimate concerns for the health and safety of the public."

None of the Commissioners appeared anxious to rise to Cowan's call for a policy change. Commission chairman Nunzio Palladino suggested that perhaps the issue was overblown somewhat. "My impression was that the real safety issues were being brought to the attention of the utilities. And the impression I have is that of the hundreds of allegations, maybe those involving wrongdoing were more like a dozen, or a number in that range."

Perhaps sensing that winds of change will not come from the NRC, at least not in the near future, some utilities have undertaken their own efforts aimed at reducing GAP's ability to produce last minute whistleblowers and allegations in the quantities now commonplace.

Consumers Power Co., for example, has attempted to go the legal route. In 1982, GAP was retained by the lead intervenor group in the licensing of Consumers' Midland plant. Soon after, in press conferences, and in communications to the NRC kept secret from the utility as well as from the ASLB, the group made reference to its possession of a large number of allegations from whistleblowers apparently documenting "poor work quality and serious safety problems." Also alluded to were charges of widespread drug and alcohol abuse, as well as incidents of waste at the work site. There was said to be a total of six affidavits in all.

Consumers asked the ASLB for power to subpoena the affidavits from GAP officials, arguing that it needed to know the contents in order to determine whether they drew attention to new problems which could be resolved. The board approved the subpoena power in mid-July 1982. GAP was to deliver the documents to Consumers, but the utility was to be denied the names of the persons making the allegations. This was acceptable, attorneys for Consumers said, because they wanted only the substance of the charges.

Subpoena Appealed

It was not acceptable to GAP, which saw a dangerous precedent being set which in time would lead to similar attacks on intervenors and public interest groups engaged in any kind of Federal administrative proceeding. It refused to honor the subpoenas.

For a year, the group fought the issue through the NRC's appeal process. In September 1983, the matter was finally placed before the five NRC Commissioners for them to decide whether the NRC would go to court in support of Consumers' efforts to obtain the affidavits. The Commission has sat on it now for eight months without acting. If it elects not to act, Consumers is then free to pursue the issue in court itself. The matter could yet become the pivotal step in curbing GAP's use of whistleblowing as a tactic to interrupt the licensing process.

For utilities not yet targeted by GAP, and which seek to minimize the potential for last minute whistleblowing campaigns, there are the options of upgrading programs for workers to express concerns of work-related matters without fear of reprisal, and of expanding the exit interviews to include not just utility employees quitting jobs at nuclear projects, but the employees of contractors as well.

Detroit Edison has implemented both options with the primary object of achieving a foolproof quality assurance program. A secondary consideration is reducing the potential for a flood of allegations to slow the licensing of its Fermi II plant which is scheduled for fuel loading sometime this summer.

Its Quality Concern Report program provides both written and telephone means for anyone on-site to voice any safety-related concerns. Anonymity is guaranteed.

More elaborate is DE's Safeteam exit interview program which is carried out by an independent consultant, and provides every departing employee an opportunity to express concerns about work being carried out at the plant. Secrecy is assured through entering the concern expressed into a computer. The person raising the concern can be matched with it by name only by an employee of the consultant who must use five different passwords to make the computerized match. This is done only when the utility investigator checking out the concern needs more information. The amplifying questions and answers are either channeled through the consultant or exchanged in correspondence which keeps the former employee's identity secret from the utility.

Participation in the exit interview is voluntary, but its availability is made very clear to all departing utility and contractor employees. The fact that it was available could be raised were the employee ever to surface as a whistleblower for an intervenor.

Over 1,500 concerns were registered in the first five months of the Detroit Edison program. Roughly a third were safety-related. One drew attention to a piece of equipment which was improperly installed and which, if not discovered until fuel loading, would have delayed startup by at a least a month, and at a cost of about $1 million a day.

While such programs can be of immeasurable value in reinforcing quality assurance programs already in place, their value in reducing intervenor introduction of last-minute allegations is questioned by some. Cowan, in comments to the NRC, said, "there is no way, in our judgment, that those programs can be 100 percent successful in getting out the charges because there are other reasons why charges are brought at the last minute, including the very reason that seems to translate into reality—namely, an effort to stop or put a roadblock in the licensing process."

GAP has said that evidence that a whistleblower had gone through the exit interview without mentioning a concern that was to surface later as an allegation would not dilute the effectiveness of that allegation. The former worker could simply claim intimidation at the time of the interview—a claim already made frequently by the group.

Still, such programs are better than nothing when a utility's objective is to get a completed plant into operation.

So long as the present rules governing intervention are in place, GAP has the tools to make reaching that objective very difficult. But that is not the reason for its existence, according to the group's executive director.

> *. . . this policy creates a situation which encourages making frivolous allegations because it places no burden on the person making the charge to supply any proof.*

"The real key to GAP's success is that we bring local citizen groups who have enthusiasm but usually lack expertise together with responsible government officials and national public interest groups, and create a coalition to which the government has to listen. For the first time, bureaucracies—public or private—who abuse the public interest aren't getting away with it just because there is no alternative voice."

Regardless of how GAP sees its mission, the NRC sees it in the vol-

me of allegations that have been in-
roduced to date, and entertains no
elief that this volume will begin to
ecrease in the near future. Accord-
ng to an NRC staff report to Senator
Alan K. Simpson (R-Wyo.), "the NRC
as received numerous last minute
llegations on projects nearing completion and a licensing decision. Such a phenomenon may be attributed to high media interest, hearings underway, and public interest groups that have decided to become involved in certain projects.

"In many of the allegations in these instances, the concerns raised are not recent concerns, but rather cover situations which occurred sometime ago and the alleger decided he/she now has reason to raise the issue. While this phenomenon has not occurred on all projects nearing a licensing decision, it is expected that such activity will not diminish and (will) perhaps increase, especially for heavily-contested projects."

—J. R. Wargo

Four-Year Record

Projects Targeted by GAP

The Government Accountability Project has intervened or has tried to intervene in the licensing of eleven reactors. The tactics in each effort have varied, as has the impact of each—in terms of time and money—on the utilities and contractors involved. In at least three cases, this impact has been substantial. In more than half of GAP's intervention efforts, however, there has been little or no measurable effect other than a temporary surge in the reporting of anti-nuclear activities by the news media. Here are the projects targeted to date by GAP.

CALLAWAY

NRC officials have stated that Union Electric Co.'s Callaway County nuclear plant will be ready for fuel loading perhaps late this spring, following correction of "very minor items." At ASLB hearings completed in 1982, intervenors were not able to raise any contentions which resulted in a delay of board approval.

Early this year, the lead intervenor launched a petition drive—so far unsuccessful—to get on the state ballot a referendum halting operation of the plant on grounds of safety. As its next step, GAP was retained as counsel. In early March, the group contacted reporters individually to announce that the intervenor had invited GAP to investigate Callaway to determine whether any Federal safety regulations had been violated during work on the plant.

According to quotes used by the general media, there was nothing substantive in the way of allegations known by the group at the time of the press conference. GAP's community organizer, Billie Garde, was quoted as saying: "The only way the public can be sure whether the Callaway plant is being built as designed is to ask the work force that built it. The Nuclear Regulatory Commission fails to do that, instead taking the self-serving statements of utilities at face value."

In essence, the press helped provide a highly publicized invitation to potential whistleblowers to make known to GAP the concerns that might constitute allegations which could be used to stop the opening of Callaway, as has been done at other plants where the group has been involved. According to remarks attributed to Garde, "at each plant GAP has investigated, conscientious employees—past and present—have come forward with construction, quality control or documentation problems which could have serious safety consequences during the operation of the plant."

GAP's preliminary investigation at Callaway marks the latest entry into the licensing process of a reactor. Ten weeks after the press conference, and only days before Union Electric was expected to receive NRC permission to load fuel, GAP had yet to indicate that any whistleblowers had contacted the group.

CATAWBA

The lead intervenor opposing licensing of Duke Power Co.'s Catawba facility, the Palmetto Alliance, retained GAP to assist its counsel a year before ASLB hearings were begun in early October of last year.

In comments to the media, GAP indicated it was relying primarily on the Alliance for whistleblowers, alluding that there were many waiting in the wings to present their allegations at the hearings. But late in these proceedings GAP implied that most were reluctant to come forward because of intimidation by utility management.

Prior to the start of hearings, GAP petitioned for and won two NRC investigations, obtained under provisions of 10 CFR 2.206, dealing with allegations that welding inspectors violated Federal regulations, and that utility officials had compromised the confidentiality of workers who had complained to the NRC. The investigations are said to be complete, but the findings have not been released.

Yet to be ruled on is a GAP petition for a 100 percent reinspection of all safety-related areas of the plant.

During the four months of the ASLB hearings, GAP produced six whistleblowers who alleged faulty work practices at Catawba—all of which utility management felt were rebutted effectively. Three of these, fearing what GAP said were the utility's standard reprisal tactics, would testify only *in camera*, and with the understanding that Duke Power attorneys present would be required to protect their identity.

Three and a half months after the hearings, but before the NRC had ruled on the GAP petition for the reinspection of safety-related work, a utility spokesman stated the measurable cost of the group's intervention amounted to the lengthening of the ASLB hearings by several weeks, and the elevation within the community of fears of nuclear energy. It was felt the full cost, however, was yet to be determined.

COMANCHE PEAK

Texas Utility Co. is shooting for fuel loading at its Comanche Peak station in September of this year. ASLB hearings, which have been held intermittently over the last two years, are down to the final intervenor contention, that dealing with quality assurance.

In mid-March, GAP made its first official appearance in the Comanche Peak case, holding a press conference to announce that on behalf of the lead intervenor, Citizens Association for Sound Energy (CASE), it was requesting from the NRC "an immediate stop work order to halt the current destruction, manipulation, and alleged falsification of documents," and "the assignment of an NRC special inspection team to determine the extent of the problems with both the design documentation and the construction deficiencies at the plant."

In support of these requests, GAP listed 26 allegations—all of them general, none documented and none attributed to any specific source. In its letter to the Commission the group suggested that, given enough time, it could flesh out the charges. "GAP recognizes that the burden of proving the need for the requested relief is ours. We have balanced that need with the concern over a timely submission to the agency of information of immediate relevance to the OI investigators. Therefore, in deference to the latter, we request that the Commission allow GAP to supplement this request at a later date, not to exceed 60 days, at the completion of GAP's preliminary investigation into the Comanche Peak project." In other words, the group was able to fire off 26 allegations on the basis of research to that point, and at the same time request two additional months for completion of its "preliminary investigation."

GAP has not appeared as counsel for CASE, which is pursuing separate allegations independently. None of GAP's charges has as yet been submitted to the ASLB, but rather all have been channeled directly to the NRC staff.

In mid-May GAP's Billie Garde told a reporter that while the Comanche Peak investigation was still in the preliminary stage, it was expected to go to full scale because the group had been contacted by "over 60" whistleblowers. So far, "The NRC has only had the benefit of about a dozen of them."

Key issues were said to deal with "harassment and intimidation . . . and these will go on throughout most of the summer. I feel these issues will see the light of day in the operating license hearing, but I'm not exactly sure in what form. We prefer the (NRC) staff to introduce them. If they don't, then we will have to."

DIABLO CANYON

In mid-April, when the NRC voted to reinstate the low power operating license for Pacific Gas & Electric Co.'s Diablo Canyon, GAP took the position that it may have lost a battle but the war would continue.

The group was involved only in the last six months of a more than ten-year fight by intervenors against licensing. In February of this year, four months after it had been retained as counsel for Mothers for Peace, GAP released 170 initial allegations said to be based on "interviews with 21 whistleblowers, five affidavits and six inches of supporting documentation."

The material supported a 10 CFR 2.206 petition to the NRC requesting deferral of any decision on a permit until completion of a comprehensive third party reinspection of all safety-related construction, an independent audit of design quality assurance, and "development of a full, factual record on PG&E's character and competence to operate the Diablo Canyon nuclear power plant."

A month later, the list of allegations had grown by another 130. Eventually, some 516 specific allegations from plant workers were given to the NRC. The volume was too great for the Commission's staff to consider them individually, so a review process was established to weed out those obviously based on material previously submitted.

This led a GAP attorney to complain after the licensing vote that the NRC had acted "even before its own licensing boards had finished reviewing whether the plant deserved licensing."

GAP then approached the Federal Court of Appeals on behalf of Mothers for Peace seeking an injunction preventing startup, but this was denied and testing began.

A month later, GAP sources indicated there were new witnesses and new allegations in preparation which would be used to continue the fight against the plant, but no dates for the new actions were given.

LASALLE

In March 1982, shortly before Commonwealth Edison Co. expected NRC permission to load fuel in the first unit of its LaSalle station, the attorney general of Illinois turned over to the NRC affidavits from workers at the site alleging improper drilling and coring of containment welds.

Very soon thereafter, GAP entered the LaSalle case on behalf of the qualified intervenor, Illinois Friends of the Earth. On the eve of what was to have been the plant's licensing, the group staged a press conference to announce their delivery to the Commission of 36 allegations which were said to be contained in affidavits from an unspecified number of workers.

In addition to repeating the attorney general's concern over drilling and coring, GAP's charges included claims that: there were laminations in the poured concrete; debris was present in large amounts in concrete forms; records were falsified to show that a large number of bolts were properly tightened; concrete was improperly cured; the plant had been sabotaged by workers, and the building housing the reactor was settling into the ground.

The NRC refused to grant a full-power license pending an investigation. After 11 weeks, the staff reported that, from among all the charges, the one alleging improperly tightened bolts did indeed apply to five of some 6,000 bolts reinspected. Many of the allegations were found to relate to construction defects previously discovered and corrected. The NRC report said that no problems were found that posed any threat to the public health.

Following release of the report, NRC was once again about to authorize a full-power license for LaSalle when GAP announced to the media and delivered to the NRC affidavits from former employees of a subcontractor at the project, alleging the falsification of records for some materials used in heating, ventilating and air conditioning systems at LaSalle. The Commission ordered that the plant be held to 50 percent of its rated capacity for six weeks pending staff investigation of these new charges, even though the utility reported its earlier discovery of the faulty records, the completion of its own 100 percent reinspection, and the undertaking of what was considered all necessary corrective action.

The direct cost to the utility in the investigation of the GAP allegations by in-house engineers and outside consultants was $1.4 million. The group is credited with delaying startup by at least one week, at a cost of approximately $1 million a day. According to a Commonwealth spokesman, the actual delay in startup was much longer because of the need to correct problems raised by NRC on the basis of its own findings and because of technical problems encountered in going to full power. To be added to GAP's impact, however, he said, "is the inestimable cost of the negative coverage it generated in the media."

MIDLAND

GAP joined the intervenors attempting to block completion of Consumers Power Co.'s two-unit Midland facility in March 1982 as a legal representative for the lead intervenor, the Lone Tree Council. After three months of preliminary investigation, it filed with the NRC six affidavits described at a press conference as listing serious allegations of unsatisfactory and unsafe work at the project.

The group insisted that the commission keep the nature of the allegations secret in order to protect the identity of the whistleblowers said to be involved. Consumers successfully sought subpoena power from the Midland ASLB in order to learn the details of the allegations, but by use of a protracted appeal process GAP so far has been able to avoid honoring the subpoena.

For more than two years GAP has made references to the media of ever-growing lists of whistleblowers and allegations. In February, it consolidated its submissions to the NRC into affidavits from 16 former workers and Michigan residents, and provided a copy of the filing to a state Senator. Under terms of the Michigan Whistleblowers Protection Act, workers who wish to be protected from possible reprisals must submit their information to a "public body."

This action was seen by the utility as an effort to avoid possible court enforcement of Consumers subpoena power, but it was seen of questionable value because the utility is seeking only details of the allegations and not the identity of the whistleblowers.

The revised list contained 65 allegations. At the time of its issuance, a regional NRC official told a Michigan reporter that the Commission had received a total of 190 allegations regarding work at Midland, and that 80 remained to be investigated by staff.

In an employee information bulletin, the Consumers Office of Public Affairs describes GAP as "a thinly disguised anti-nuclear group which has been waging a relentless campaign against the Midland nuclear plant and other nuclear power projects around the country. . .

"GAP's tactics include recruiting

disgruntled employees, obtaining 'allegations' of construction and design problems, and then ultimately withholding the information it receives from the involved utilities, while posturing before the media. Similar GAP tactics at plants in Illinois and California failed when investigations found there was no substance to the charges. However, proving the falseness of the GAP claims delayed operation of the plants and added millions of dollars to the cost."

PALO VERDE

In mid-December of last year, GAP teamed up with the Palo Verde Intervention Fund, lead intervenor at Arizona Public Service Co.'s Palo Verde project, in making charges that new or still serviceable tools had been buried in large quantities at the site.

The allegations, attributed to former site workers, included the claim that the practice was carried out in order to create the need for replacement tools, purchased in part from a subsidiary of the primary contractor, Bechtel Power Corp., and in this way added to overall contractor revenues from the project.

In this case, GAP's tactic of making last minute allegations was timed not to delay a licensing action, but to prejudice the Arizona Corporation Commission's consideration of a utility request for emergency rate relief, for which public hearings were to begin the week after the charges were made.

Following APS and Bechtel denials of the charges, the state attorney general asked for more evidence in the way of refutation. The contractor offered services worth $300,000 to be used in searching for the tools at points specified by the former workers making the allegations. The digging was carried out between April 2 and May 1. On the final day, the attorney general conceded that no tools had been uncovered.

At a GAP press conference the charge was made that the digging was in the wrong places, and never deep enough—that the tools were buried as much as 50 feet below the surface. Bechtel countered by pointing out that more than one-third of the entire burial site had been dug up, and that across the entire area bedrock was reached at between 15 and 25 feet.

According to a Bechtel spokesman, "clearly we dealt a blow to the credibility of GAP."

The buried tools incident was GAP's second involvement at Palo Verde. Earlier it appeared as counsel for a former worker who reported to the NRC that electrical installation records were being signed by persons other than those performing the work. Following an NRC investigation APS was assessed a $40,000 fine.

According to sources at GAP, its involvement at Palo Verde is classed

AP MEANS
GAP IS CRAP
CLOSE GAP BEFORE IT CLOSES MICH
Goons Against Progress

BUILDING TRADESMEN DEMONSTRATED early this year before the state capitol in Lansing, Mich., in protest of GAP's refusal to reveal details of worker allegations said to concern safety-related problems at Consumers Power Co.'s Midland plant. Inside the building, GAP was announcing new, secret allegations.

being in the "preliminary investi-
ation" stage.

AN ONOFRE

In October 1982 GAP appeared as ounsel for a former Bechtel Power orp. employee who charged that ubstandard welds were approved in e construction of Southern Califoria Edison's San Onofre Unit 3.

The whistleblower had worked at e project for 10 months, beginning October 1980. He was then transerred to Bechtel's operation at Conumers Power Co.'s Palisades plant, nd from there to the utility's Midand project. At Midland, he was ismissed for, according to Bechtel, ailure to pass oral examinations for ualification as welding inspector. he former employee attributed his ismissal to his having been too crital of welding work at the site.

According to the San Onofre alleation, Bechtel failed to follow Amercan Welding Society code requirenents for a special type of reinforcing weld used on thousands of piping nd electrical support beams hroughout the plant. A separate harge held that workers often used a pipe-cutting tool rather than an approved marking device to enscribe lines on piping.

An NRC investigation, involving 242 inspector hours and a seven-hour interview with the former employee himself, concluded that "none of the allegations concerning nuclear safety-related systems and components was substantiated and no violations of NRC regulations were identified."

GAP states it intends to pursue the llegations at some time in the future.

THREE MILE ISLAND

Early last year, Richard Parks, a senior startup engineer working for Bechtel Power Corp. on recovery work at TMI-2, retained GAP as counsel in actions involving the NRC and the U.S. Department of Labor.

In a complaint filed with the latter agency in late March, Parks and GAP charged that Bechtel engaged in harassment and intimidation activities aimed at demoting and then firing him after he and others "revealed massive quality assurance violations and significant safety concerns" at the TMI cleanup operation.

Filed concurrently with NRC was a 56-page affidavit detailing these charges. Parks' primary concern centered on the use of the polar crane intended for use in removing the reactor vessel head. Included in his specific allegations were claims that safety-related modifications to equipment and components were carried out without full prior engineering and approval, plans were in place to use the crane without conducting all necessary safety tests, and that there was "NRC collusion in the misconduct."

Work with the crane was delayed a year while the NRC conducted two investigations. The first, completed Feb. 11 of this year, found there were some procedural problems between the utility and its contractor, but that these were "of minor safety significance," if any. A spokesman at the site stated that the utility and Bechtel "were already aware of these procedural problems and were working on them at the time Parks made his allegations."

Nine days after release of the second NRC report, which vindicated procedures in place, the crane underwent preliminary tests successfully.

WATERFORD-3

GAP's "preliminary investigation" of possible safety concerns at Louisiana Power & Light Co.'s Waterford-3 plant was launched in public at a press conference held in New Orleans on April 11 of this year, about four months before the utility expects to be issued a low power operating permit.

GAP was retained by the lead intervenor opposing the plant, Citizens for Safe Energy, which had been unable to raise effective obstacles to licensing during ASLB hearings which concluded in 1982.

The opening shot consisted of thirteen "specific problems and allegations" compiled for submission to the NRC. These were accompanied by an invitation to would-be whistleblowers to come forward and give their concerns to the group.

As of late May there had been no further announcements by GAP concerning Waterford.

ZIMMER

Intervention by GAP into Cincinnati Gas & Electric Co.'s Zimmer plant, first on behalf of a whistleblower and then as counsel for the lead anti-nuclear group, gave the organization a degree of national prominence which led to its being invited to participate in actions against other reactor projects.

Opponents of GAP concede it was the group's pressure that played a significant role leading to the decision in January of this year to cancel the project, but insist that the allegations raised were almost exclusively old, resolved issues that no longer affected the safety of the plant.

According to a source for the group, GAP is "keeping the files open on the case. This is in case the government needs any evidence regarding criminality on the part of utility executives in matters involving violations of the Atomic Energy Act. We also have (pending) some FOIA (Freedom of Information Act) requests we've filed with the NRC. These mostly involve investigations conducted over the last year and a half that have not yet been released. We want to know the status of those investigations."

—J.R.W.

APPENDIX II
Additional Material Submitted for the Record

An Assessment of The GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1

by
Admiral H. G. Rickover,
USN

November 19, 1983

Preface

Admiral
H. G. Rickover
USN

By letter of September 2, 1983, Mr. William G. Kuhns, Chairman, General Public Utilities, requested me to assess the GPU Nuclear Corporation, including the soundness of the organization and its senior management, in anticipation of the operation of the undamaged nuclear plant at Three Mile Island (TMI-1). He assured me of complete and open access to all GPU personnel, facilities, and information, as well as freedom to use whatever other resources, personnel, or sources of information I might wish.

I am often asked how I ran the Naval Reactors Program, sometimes by people hoping to find methods for use in their own work. Frequently there seems to be an expectation that I could tell them about some simple, easy procedure which made the Naval program function. Unfortunately there is none. Any successful program functions as an integrated whole of many factors. Trying to select one as the key will not work. Each element depends on all the other elements.

This is something that can be learned only through personally experiencing operating responsibility and making hard decisions. A lack of operating experience in people responsible to evaluate the competence of organizations leads too often to focusing on trivial details or on vague generalizations. Attaining competence and reliability in a nuclear operation is difficult, but recognizing them is not. In fact, with experience in operation, it is possible to lay down certain principles which are essential to safety, and are observable and verifiable.

Mr. Kuhns' request offered me the opportunity to apply the successful principles on which the Naval program was based to an evaluation of GPU Nuclear's competence to operate TMI-1. Although commercial nuclear plants and Naval nuclear plants differ in many ways, they do not differ in the underlying principles which make for safe operation. These apply equally to both. It is my hope that, by performing this assessment, those principles will become more widely understood and practiced. Since nuclear power is clearly here to stay, such attitudes and principles must, in my opinion, become industry's standard. I therefore accepted Mr. Kuhns' invitation.

Fortunately, I was able to enlist the support of three of my early associates from the Navy program: James M. Dunford, Jack C. Grigg, and Robert V. Laney. These people spent many years assisting me in developing, building, and operating nuclear power for the Navy. They are well-versed in the principles which guided that work and are practiced in discerning where these principles are being used or ignored. They assisted me throughout this assessment.

We made two early decisions affecting the scope of the assessment:

First, we would focus on the competence of the present GPU Nuclear organization and the people who are now responsible to manage it, rather than on managers who are now absent.

Second, we would focus on the management of GPU Nuclear's operational reactor at Three Mile Island and, to a lesser extent, Oyster Creek, but exclude the TMI-2 salvage operation.

We were aided in our assessments by several recent evaluations of GPU Nuclear. These include two detailed assessments by the staff of the Nuclear Regulatory Commission, two by the Institute of Nuclear Power Operations, and one by the Atomic Safety and Licensing Board. Although different in scope, these focused on specific organizational features and management practices.

While noting that these assessments all reach conclusions which are favorable to GPU Nuclear, our assessment is based on our own direct observations. However, because these previous reviews all focus on traditional management functions, our assessment is directed much more toward management's fundamental understanding and practice of underlying principles of operation.

I have mentioned the principles of operation which I used in building the Naval Reactor Program. I emphasize that these are principles, not procedures or practices. Procedures or practices must be changed as circumstances change. Principles are constant and can be applied now and in the future. If a management is imbued with these principles and accustomed to using them, it will adapt to change. The principles are defined in the body of the assessment report, Section II-E; they are stated here in the form of management objectives:

1. Require Rising Standards of Adequacy.
2. Be Technically Self-Sufficient.
3. Face Facts.
4. Respect Even Small Amounts of Radiation.
5. Require Relentless Training.
6. Require Adherence to the Concept of Total Responsibility.
7. Develop the Capacity to Learn from Experience.

These principles express attitudes and beliefs. They acknowledge the complex technology. They recognize that safe nuclear operation requires painstaking care. They declare that a nuclear management must be responsible—all the time. Although easily stated and readily defined, these principles are exceedingly demanding of a management which chooses to adopt and follow them. If management has chosen such a course, it will lead to a competent and dependable operation.

It is extremely important that senior management become technically informed and be personally familiar with conditions at the operating plant. They should visit the plants frequently, at irregular hours, inspect selected portions, and leave a written record of what they observed and how long they remained. These would be surprise inspections for which people could not prepare ahead of time. In this way, the pressure will be to maintain the plant in excellent condition at all times.

I believe that our criteria, and the principles on which they are based, measure more than the structural or technical adequacy of an organization. If used knowledgeably, they can expose a management's motivation to act responsibly, which we call integrity. A lack of integrity would be incompatible with conformance to these criteria.

Based on the assessment of the GPU Nuclear Corporation, including the soundness of its organization and senior management as reported herein, I conclude that the Corporation has the management competence and integrity to safely operate TMI-1.

H. G. Rickover.

H. G. Rickover

November 19, 1983

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I. Summary

A. Scope. This is an assessment of the GPU Nuclear Corporation, including the soundness of its organization and senior management, in anticipation of the operation of TMI-1. The focus is expressly on the present management and its qualifications to operate nuclear plants. The methods and criteria used in the evaluation were selected for that purpose.

The assessment team is aware of a number of questions currently being reviewed by the NRC which, in varying degrees, are perceived as bearing on "fitness to operate." These questions relate to events which took place several years ago or to recent events related to the conduct of salvage operations at TMI-2. We address neither of these. The early events are excluded from the evaluation because the competence of the present management could not credibly be measured by events which took place under a previous management so thoroughly different. The TMI-2 operation is excluded because it is, in a technical sense, a very different kind of activity than power plant operation.

The assessment thus concentrates on the fitness of the present management of the GPU Nuclear Corporation and its TMI-1 and Oyster Creek Stations. The information obtained from these sources is used, together with criteria described below, to assess management's qualifications to operate TMI-1.

B. Method. The existence of several recent and valuable evaluations by the Nuclear Regulatory Commission, the Institute of Nuclear Power Operations, and the Atomic Safety and Licensing Board, uniformly structured around traditional management functions, argued strongly that this assessment should not follow the same pattern. We intend to provide a fresh perspective on the meaning of "fitness to operate" and a different approach to measuring it. This is an appraisal of management's understanding and application of tested "principles of operation" which are fundamental to all nuclear power activities. These principles and the measurement criteria derived from them are described in Section II-E of this report.

The assessment was conducted by reviewing numerous documents describing the management structure and its current performance; by inspecting TMI-1 and Oyster Creek Stations and related training facilities; by interviewing a representative sample of managers; and by applying the principles of operation and related criteria to the information thus obtained.

The assessment team was given full access to people, facilities, and records of its choice, and its questions were answered promptly and frankly.

The documents reviewed (Appendix A) were selected to give the team an understanding of differing points of view about management competence; to use previous assessments as a means of directing our own inquiries toward management areas which had previously been questioned by others; and to review enough examples of management's written policies and procedures to form a basis for assessing its operating standards.

The list of managers interviewed (Appendix B) in this assessment includes most of the senior managers at corporate headquarters and a representative sample of managers at the TMI-1 and Oyster Creek Stations, including the Vice Presidents/Site Managers, and many of their principal subordinates and support function managers located at the stations. We interviewed individuals five levels below the Corporate President, four levels below the Station Manager, and at various levels in between. In total, 49 managers were interviewed.

The assessment team members, all having extensive experience in conducting similar interviews, directed their questions toward the following specific objectives:

> To learn, within the range of the respondent's direct observation and field of expertise, the conditions and management attitudes as they were in 1979.
>
> To learn the respondent's observations as to present conditions and management attitudes, within the range of his personal observation and expertise.
>
> To obtain the respondent's assessment of the differences between 1979 and the present, his explanation of the reasons for these differences, and to test his credibility.
>
> To assess each individual's qualifications for the responsibilities of his job.

C. Criteria of Competence. While the physical aspects of commercial nuclear power stations differ substantially from Navy nuclear propulsion plants, the same underlying precepts must govern the operation of both. It is important that these precepts be clearly understood. The criteria used to assess the competence of the GPU Nuclear Corporation to operate TMI-1 are:

1. Require Rising Standards of Adequacy.
2. Be Technically Self-Sufficient.
3. Face Facts.
4. Respect Even Small Amounts of Radiation.
5. Require Relentless Training.
6. Require Adherence to the Concept of Total Responsibility.
7. Develop the Capacity to learn from Experience.

We believe that these criteria are qualitatively different from and in some respects superior to functional criteria customarily used to evaluate a management's performance. They go beyond questions of the adequacy of organizational structure and the number and quality of staff. The criteria described below address management's basic attitudes toward safe operation, explore their underlying motivation, and examine the force of the example given to the rest of the organization. In addition to testing present fitness to operate, these criteria can also tell us something about how a management is likely to respond to future events.

D. Conclusion and Recommendations.

1. **Conclusions.** Based on the assessment of the GPU Nuclear Corporation and its organization and senior management as reported herein, the team concludes that GPU Nuclear Corporation has the management competence and integrity to safely operate the TMI-1 plant.

2. **Recommendations.** In the course of the investigation, several items were observed which, if adopted, would enhance the operation of the TMI-1 plant. While they are not considered necessary prior to restart, the team recommends they be adopted.

   a. GPU Nuclear should devise a plan to upgrade the operation and support of the TMI-1 and Oyster Creek plants, to achieve a ranking in the top one-sixth of all commercial nuclear plants in the Institute of Nuclear Power Operations (INPO) evaluations. Milestones should be set in each area and progress measured against these milestones.

   b. GPU and GPU Nuclear senior management should become technically informed and personally familiar with conditions at the operating plant. They should visit the plants frequently, at irregular hours, inspect selected portions, and leave a written record of what they observed and how long they remained.

   c. ~~Some~~ personnel in the TMI-1 Training Department responsible for training licensed operators are not yet qualified Senior Reactor Operators. We recommend that these personnel complete qualification procedures on TMI-1 as soon as possible.

   d. GPU Nuclear should continue to reduce its dependence on the use of consultants. The organization should become self-sufficient to the point where use of such personnel would be necessary only in special circumstances where development of in-house capability could not be justified.

   e. The general announcing system for the TMI plant distracts personnel in the control room. The system should be modified to significantly reduce these broadcasts to the control room. This will prevent distraction of operators from their primary duties. Also, too many people are in the control room. Only those essential to the operation of the plant should be there. Instructions to this effect should be posted and complied with.

II. Methods and Criteria

A. Scope. This is an assessment of the GPU Nuclear Corporation, including the soundness of its organization and senior management, in anticipation of the operation of TMI-1. The focus is expressly on the present management and its qualifications to operate nuclear plants. The methods and criteria used in the evaluation were selected for that purpose.

The assessment team is aware of a number of questions currently being reviewed by the NRC which, in varying degrees, are perceived as bearing on "fitness to operate." These questions relate to events which took place several years ago or to recent events related to the conduct of salvage operations at TMI-2. We address neither of these.

The early events are excluded from the evaluation because the competence of the present management could not credibly be measured by events which took place under a previous management so thoroughly different. The nature and extent of the differences are reported in Section III of this report.

The TMI-2 operation is excluded because it is, in a technical sense, a very different kind of activity than power plant operation and because it is being conducted through a prime contract arrangement having no counterpart in GPU Nuclear's nuclear station operations.

The assessment thus concentrates on the fitness of the management of the GPU Nuclear Corporation and its TMI-1 and Oyster Creek Stations. The information obtained from these sources is used, together with criteria described below, to assess management's qualifications to operate TMI-1.

B. Method. Among the documents the team reviewed are several which evaluate various aspects of the company's current organization and performance. These include detailed assessments by the NRC staff and Institute of Nuclear Power Operations in 1982 and 1983, as well as an Atomic Safety and Licensing Board evaluation of August 1981. Although these differ in method and style, they are similar in their focus on the key functional elements: management and administration; operations; technical support; training; maintenance; radiological control; and quality assurance. Obviously, an assessment of management's performance in each of these areas gives, in the aggregate, a basis for evaluating management's overall competence.

The existence of these recent evaluations, uniformly structured around traditional management functions, argued strongly that this assessment should not follow the same pattern. We intend, instead, to provide a fresh perspective on the meaning of "fitness to operate" and a different approach to measuring it. This is an appraisal of management's understanding and application of tested "principles of operation" which are fundamental to all nuclear power activities. These principles and the measurement criteria derived from them are described in Section II-E.

The assessment was conducted by reviewing numerous documents describing the management structure and its current performance; by inspecting TMI-1 and Oyster Creek Stations and related training facilities; by interviewing a representative sample of managers; and by applying the principles of operation and related criteria to the information thus obtained.

The assessment team was given full access to people, facilities, and records of its choice, and its questions were answered promptly and frankly.

Document Reviews, personnel interviews, and criteria of competence are described in the following Sections C, D, and E.

C. Document Review. The documents reviewed are listed in Appendix A to this report. They were selected to meet several needs: namely, to give the team an understanding of differing points of view about management competence; to use previous assessments as a means of directing our own inquiries toward management areas which had previously been questioned by others; and to review enough examples of management's written policies and procedures to form a basis for assessing its operating standards. This is not meant to be an exhaustive list of relevant documents, yet we believe it fairly represents the much larger body of available material and is sufficient for the purpose of this assessment.

D. Interviews. The managers interviewed in this assessment are listed in Appendix B. The list includes most of the senior managers at corporate headquarters and a representative sample of managers at the TMI-1 and Oyster Creek Stations, including the Vice Presidents/Site Managers, and many of their principal subordinates and support function managers located at the stations. We interviewed individuals five levels below the Corporate President, four levels below the Station Manager, and at various levels in between. In total, 49 managers were interviewed.

Interviews were conducted in private, with two or three team members questioning one manager. The assessment team members, all having extensive experience in conducting similar interviews, directed their questions toward the following specific objectives:

> To learn, within the range of the respondent's direct observation and field of expertise, the conditions and management attitudes as they were in 1979. Those interviewed who were hired after the accident were asked to describe conditions and attitudes which existed at the time of their arrival.
>
> To learn the respondent's observations as to present conditions and management attitudes, within the range of his personal observation and expertise.
>
> To obtain the respondent's assessment of the differences between 1979 and the present, his explanation of the reasons for these differences, and to test his credibility.
>
> To assess each individual's qualifications for the responsiblities of his job.

E. Criteria of Management Competence. The criteria of competence used in this assessment are based on the successful operating principles which guided the development and safe performance of the Nuclear Navy during its formative years. We believe that these principles are valid now as they were then.

While the physical aspects of commercial nuclear power stations differ substantially from navy nuclear propulsion plants, the same underlying precepts must govern the operation of both. It is important that these precepts be clearly understood. The following paragraphs identify and describe the criteria used to assess the competence of the GPU Nuclear Corporation to operate TMI-1 and to show how they relate to underlying operating principles.

We believe that these criteria are qualitatively different from, and in some respects superior to, functional criteria customarily used to evaluate management's performance. They go beyond questions of the adequacy of organizational structure and the number and quality of staff. The criteria described below address management's basic attitudes toward safe operation, explore their underlying motivation, and examine the force of the example given to the rest of the organization. In addition to testing present fitness to operate, these criteria can also tell us something about how management is likely to respond to future events.

The criteria are briefly described in the following paragraphs:

(1) Rising Standard of Adequacy. Excellence in operating nuclear power plants cannot be achieved merely by meeting a set of minimum standards. Excellence is achieved by raising standards and goals when lower thresholds of competence have been reached. It is necessary, of course, to define minimum requirements, particularly when evaluating eligibility for an operating license. However, the competence of nuclear operations management must be measured not only by success in reaching prescribed minimums but by its determination and success in exceeding them.

(2) Technical Self-Sufficiency. Nuclear power is a technology whose complexity far exceeds that of other common methods of generating electricity. Commercial nuclear power is less than 25 years old and is still evolving and changing. It is essential that decision-making managers not only have extensive technical training themselves, but that they also have expert analytical and engineering resources readily available within their own organization. It is insufficient to rely solely, or even primarily, on outside contractors or consultants for technical support, a practice which is commonly used. A nuclear utility must have its own broad-based technical staff capable of all but the most specialized services.

Based on this operating principle, the team assessed the strength, diversity, and adequacy of GPU Nuclear's in-house technical resources in support of plant operation.

(3) Facing Facts. A problem cannot be solved until it is transmitted to and acknowledged at the organizational level where it can be properly addressed. Unfortunately, there is a disposition common to all operating organizations to minimize the potential consequences of problems, especially when blame may attach to the reporter or when the solution may require higher level assistance. Facing up to difficulties, regularly informing higher levels of management of them, and determining and correcting their root causes involve attitudes and practices which are essential to operating competence.

GPU Nuclear's policies and practices on these matters were examined.

(4) Respect for Radiation. It is incumbent on nuclear plant operators to minimize personnel radiation exposure by all reasonable means. A constant concern for the undesirable biological consequences of even small amounts of radiation and an insistence on reducing them are characteristics of a competent nuclear management. Since exposure levels allowed by regulations are seldom approached in practice, management's intent and ability to accomplish the purposes of the "As Low As Reasonably Attainable" (ALARA) program can be tested by examining its Radiological Control Program and the measures which it has adopted to minimize exposures.

GPU Nuclear's Radiological Control Program was examined for examples of innovative steps being taken to reduce exposure and to observe the importance which management attaches to its ALARA commitment.

(5) The Importance of Training. The selection and training of operators is at least as important as any other element of safe reactor operation. It is vital that the mental abilities, qualities of judgment, and level of training be commensurate with the responsibility involved in operating a nuclear station. A management's attitude toward excellence in operation and its understanding of how to achieve excellence are both revealed in the quality of training provided.

GPU Nuclear's training program was closely examined and evaluated.

(6) Concept of Total Responsibility. Operating nuclear plants safely requires adherence to a total concept wherein all elements are recognized as important and each is constantly reinforced. Training, equipment maintenance, technical support, radiological control, and quality control are essential elements, but safety is achieved through integrating them effectively in operating decisions. Management's understanding of this principle at the corporate and plant levels is a valid measure of competence. The organizational structure gives some indication of management's awareness, but is less important than understanding and applying the principle.

GPU Nuclear Managers were interviewed to determine their understanding of the relationship between support functions and the conduct of plant operations, to observe the effectiveness with which they are being integrated, and to test for the concept of total responsibility.

(7) Capacity to Learn from Experience. Since we are dealing with persons and machines which cannot be made perfect, it is important to recognize that mistakes will be made. We must do our best to design machines having tolerance for mistakes and to continue to improve them through experience. This process of evolutionary improvement, the basis for much of our most useful technology, depends on a capacity to acknowledge mistakes and to determine and correct their underlying causes, whatever the cost. An inability or unwillingness to learn from experience is intolerable in nuclear operations.

The GPU Nuclear management was assessed with respect to its policies and practices in identifying operational problems, searching out their root causes, and applying the lessons learned.

III. Assessment

A. Introduction. This section contains an assessment of the competence of GPU Nuclear Corporation's management in terms of the basic operating principles previously defined. Under each criterion, we provide a comparison between management attitudes and operating conditions which prevailed in the 1979 period and those of today. The former conditions are derived from the personal observations of managers interviewed. Present conditions are based on the assessment team's own observations, on their reading of relevant documents, and on responses to questions in interviews.

In addition to comparing conditions in 1979 and 1983, we trace the differences, where appropriate, to specific changes in management attitudes and policies. This process leads to an appraisal of the competence of the present management, and assesses the extent of its understanding and application of these proven operating principles.

B. Assessment against Criteria. For the reader's convenience, each assessment is given the same number as the corresponding criterion in Section II-E.

(1) Rising Standard of Adequacy. As stated earlier, excellence in operating nuclear power plants cannot be achieved merely by meeting a set of minimum standards. A technology having inherent public risk, a technology which is still new and still evolving, must be built upon rising standards of excellence which substantially exceed those used for licensing purposes. The degree to which a management understands and applies this principle is one measure of its competence and reliability.

We found evidence from our interviews that the prevailing attitudes and policies at the time of the accident can best be described as, "Operate in accordance with the conditions of the license and applicable regulations." We found no evidence that, at that time, regulatory requirements were considered to be goals to be exceeded, or that management had a policy which deliberately encouraged the use of standards exceeding those mandated by regulation.

Individual managers whom we interviewed referred to numerous conditions existing in 1979 which they now consider to have been deficient, at least by today's standards. Such deficiencies were identified, for example, in training programs, inhouse technical competence, preventive and corrective maintenance programs, safety assessment, quality assurance scope, and numbers of operators available for shift duty. We did not investigate nor do we suggest that the TMI-1 practices in 1979 were necessarily different from the industry norms of the time. Our interest here is to examine the management's present attitudes and policies with respect to standards of adequacy, to compare them with the 1979 time period, and to identify any changes which have occurred and the reasons for them.

We note that, in June 1980, a policy directive to all TMI managers carried the following message:

> "We will, of course, also meet applicable regulations, etc., but that is not automatically sufficient. I look to each of you to continually ask yourself 'What is the right thing to do,' not just 'what do the regulations or license require.'... Understanding and applying the principle that first and foremost we must satisfy our own standards is a vital and part of carrying out our responsibilities."

Our interviews with corporate managers reinforce the vitality of the above-quoted policy. GPU Nuclear managers today are expected and encouraged to do more than merely meet regulatory requirements. They are expected to achieve levels of performance which meet their own professional standards of excellence, and which equal or exceed the best practice in the industry. Such a policy, provided it is confirmed in deeds, marks a radical departure from the past. The assessment team looked for objective evidence.

The evidence which we found abundantly confirms that this policy reflects the intent of management. The policy is widely understood and followed at those levels in middle management where interpretative decisions and budget requests originate. We found that operating managers and service managers alike function and plan ahead with confidence that corporate resources will be made available to them to improve their levels of performance beyond that required. Specific cases will be found throughout this report showing that GPU Nuclear has established and continues to develop safety and reliability practices which lie beyond regulatory requirements. A few brief examples of such practices are listed here:

- Training — Present training exceeds regulatory requirements in breadth, depth, and diversity of personnel trained. (See Section III-B(5), below)
- In-House Technical Competence — Present inhouse technical resources, both at corporate and plant levels, show an extraordinary depth of talent dedicated to the support of operations. (See Section III-B(2), below)
- Maintenance — Formal preventive and corrective maintenance programs have been established and are growing in strength.
- Safety Assessment — GPU Nuclear has established an independent safety assurance function at the corporate level; has independent on-site safety review groups; carries out a formal safety review of all documents or

changes to them which affect operation; and in addition, maintains General Office Review Boards, containing some outside members, to advise the Chief Operating Officer and the Corporate Board of Directors on safety matters affecting each station.

- Quality Assurance Scope — GPU Nuclear is an industry leader in recognizing the need to broaden the definition of matters relating to safety and in implementing that broadened definition in their Operational Quality Assurance Plan. GPU Nuclear has recently become the first utility which has qualified and been authorized by the National Board of Boiler and Pressure Vessel Inspectors to use the "R" and "NR" stamps in performing repairs.
- Number of Operators Available for Shift — GPU Nuclear plans to provide six full shifts of operators in order to assure that one shift will always be available for training. This goal is expected to be met prior to plant start-up.

As noted above, the assessment team observed many other examples in addition to these. Some of the others will be found in following Sections III-B(2) to III-B(7).

The assessment team finds that the present GPU Nuclear Corporation's management understands the operating principle of Rising Standards of Adequacy and is applying it effectively. As a result, there are numerous areas of activity where GPU Nuclear's standards now significantly exceed those required by regulation.

(2) Technical Competence. Decision-making managers must not only have extensive technical training themselves, but must also have expert analytical and engineering resources readily available to them in their own organization.

Prior to March 1979, the TMI-1 plant had a small in-plant engineering staff of 18 to support operations and maintenance. In addition, there were 16 engineers at Metropolitan Edison headquarters with competence in design engineering, radiation safety, and environmental engineering. Additional engineering support could be obtained, if called for, from GPU Service Corporation, Parsippany, New Jersey; Babcock and Wilcox, Lynchburg, Virginia; and Gilbert Associates, Reading, Pennsylvania, the TMI-1 architect/engineer. However, these three organizations had no personnel solely dedicated to the support of TMI-1, and hence could not be utilized as readily as in-house staff.

In contrast with the 1979 situation, TMI-1 now has a Plant Engineering Staff of 27 reporting to the Station Manager; an on-site Technical Functions staff of 40 professionals, reporting to the Technical Functions Vice-President at corporate headquarters; and a headquarters technical support staff of 65 professionals dedicated to TMI-1. These numbers, totaling 132, do not include other engineering professionals in the corporate Nuclear Assurance, Radiological Control, and Maintenance and Construction Departments, nor do they take account of the remainder of the corporate Technical Functions Staff, about 200 professionals, who are supporting TMI-2 and Oyster Creek, but could, under special circumstances, assist TMI-1.

It is quite evident that, on the basis of numbers alone, GPU Nuclear has committed an extraordinary range of technical resources to TMI-1.

The team reviewed the experience and training of the management personnel at the operating stations and headquarters in order to assess their technical competence. Personnel interviewed included the Vice President, TMI-1; Vice President, Oyster Creek; Operations and Maintenance Directors; Plant Engineering Directors, Manager, Plant Operations; etc., as well as senior managers at headquarters. The general level of education, training, and experience in the pertinent nuclear disciplines was considered adequate. It was notable that more than half of the total managers, professionals, and licensed operators assigned to TMI-1 have been hired into GPU Nuclear since March 1979.

A major steam generator repair has recently been completed by TMI-1. This work involved virtually all in-plant personnel, was technically complex and difficult, and was skillfully carried out in the presence of high radiation levels. Its successful completion demonstrates the organization's maturity and operational competence in this kind of evolution.

The Technical Functions organization at corporate headquarters has been almost totally put in place since the accident. The organization includes Engineering Services, Licensing and Regulatory Affairs, Engineering and Design, Systems Engineering, Engineering Projects, and Start-Up and Test. The team particularly noted that GPU Nuclear now has both plant analysis and control and safety analysis capabilities in the Systems Engineering Section. The Technical Functions Division has the necessary mix of engineering and plant design talent to perform conceptual designs of most plant modifications. Additionally, Technical Functions now provides on-shift Technical Advisors in the plant at all times.

Finally, TMI-1 will have a full six shifts of qualified operators, permitting one week in seven to be devoted to operator training for maintaining the required level of competence.

The assessment team concluded that GPU Nuclear managers have appropriate and adequate levels of technical training, and that in-house technical resources are clearly ample in diversity and depth to support the operation of TMI-1.

(3) Facing Facts. Facing up to difficulties, regularly informing higher levels of management of problems and determining and correcting their root causes involve attitudes and practices which are essential to operating competence. Unfortunately, there is a disposition in all operating organizations to minimize the potential consequences of problems and to try to solve them with the limited resources available at the level where they are first recognized. The practice of forcing problems up to higher levels where greater resources can be applied must be assiduously fostered by top-level managers.

The formation and structure of the GPU Nuclear Corporation provides one of the most important indications that the present management intends to keep itself informed of operating problems. The purpose in forming GPU Nuclear, as stated in GPU's organization manual, is to "provide a full-time dedicated management for the single purpose of safe and effective operation of all nuclear facilities in the system."

The organization is so structured that Technical Functions; Radiological and Environmental Controls; and Nuclear Assurance, including Training and Quality Assurance, report directly to the President of GPU Nuclear, and each has personnel at the operating sites to provide independent reviews of the quality of the operations. The site-based units support operations; and, as the assessment team points out elsewhere in this report, a strong team spirit exists at the sites. At the same time, from the viewpoint of exposing problems, it is clear that the existence of the independent reporting channels described above can give corporate management substantially greater insight into plant operations than they would have if all such functions reported directly to the Station Manager as they did in 1979.

The increased visibility which this arrangement gives corporate management is accentuated by another new practice which is now in use. The GPU Nuclear President requires bi-weekly Signifcant Event Reports from the Vice President/Station Manager, as well as from each support division Vice President (Technical, Maintenance and Construction, Radiological Control, Quality Assurance, and Nuclear Assurance). These reports are typically five to ten pages in length, and expressly point out problems. Thus he and his immediate staff see not one but several views of the conditions at the station, each presenting a different perspective.

In fact, the assessment team observed at all levels of management a dedication to the policy of full problem disclosure, investigation, and remedy. The following examples show how this policy is being implemented:

- Administrative Procedure No. 1029 at TMI-1 (No. 105 at Oyster Creek) sets down standards of operating conduct, emphasizing safety. It requires that all significant off-normal incidents be reported in writing and analyzed for cause. Such incidents are reviewed with personnel from all shifts, are included in future operator training programs, and are sent for review by the Independent On-Site Safety Review Group.
- In-plant management at TMI-1 holds daily planning meetings, involving on-site service managers, which are devoted to bringing problems to the surface for solution.
- Senior station managers, including service managers, make night-shift plant tours to assist in identifying problems at an early stage.
- The Quality Control Department has a procedure by which problems which are unresolved after a predetermined period of time are escalated progressively to higher management levels until resolved.
- GPU Nuclear has an Ombudsman to whom any employee can bring any problem or perceived problem. Complete anonymity is assured, and the employee is provided a written reply to his question or concern.

The assessment team tested the flow of information to various levels of management by questioning personnel on specific occurrences and problems. We found that such information is being widely distributed and that problems are appropriately escalated and additional resources applied as needed.

The present GPU Nuclear Management has generated an atmosphere of openness which is conducive to facing facts and resolving problems.

(4) Respect for Radiation. One criterion for judging the quality of management of a nuclear plant in the degree to which radiation control (Rad Con) is given prominence in organizational level, in staffing, and in the demand for high standards of performance in this area. This attitude of management is not always found because radiation problems are new even to experienced managers in non-nuclear plants and are generally underrated. Radiation sources are elusive and the effects of poor radiation control are not easy to see. There is a tendency to look on the control requirements as overdone and, in any case, to be within the capability of the normal work force to carry out.

Effective radiation control means that a technically well-conceived program must be in place with trained Rad Con technicians assigned and strict adherence to procedures enforced. These will not be present without strong management support and involvement through goal-setting, progress reports, and first-hand observations of operations.

A comparison of Rad Con at Three Mile Island — before the accident and today — shows the same story as has been observed in several other areas of plant operation: namely, a significant upgrading has occurred. This change in Rad Con is due in no little part to the determination on the part of top management of the Utility to elevate the status of Rad Con in the organization and to demand that this function meet the highest standard it was reasonable to set. A GPU Nuclear Vice President with previous experience in Rad Con was appointed, goals were set, support for added personnel and facilities was given, and top-level monitoring of progress was instituted.

Our study of Rad Con at TMI-1 showed that many steps have been taken to upgrade the program there and at Oyster Creek. The goals have been set and the decisions on facilities and staff have been made on the basis of getting the best, not just meeting the minimums. Taken as a whole, the actions described in the following paragraphs are evidence of top management's awareness of the importance of radiological control and of its determination to give full support to the program for its control.

- Personnel. The TMI-1 Radiological Control organization in 1979 was small in size — about ten technicians assigned to TMI-1 — and reported to the Manager of Administration of the site, certainly a modest level of visibility for this important function.

  Today, the Manager, Radiological Controls, at TMI-1 reports directly to the GPU Nuclear Vice President, Radiological and Environmental Controls, and has a group of 47 supervisors, engineers, and technicians assigned to TMI-1.

- Training and formal qualification of Rad Con technicians is managed by the Rad Con Department at TMI-1. Training in fundamentals is provided by the Training Department, but Rad Con monitors its content and effectiveness. Specific Rad Con training and qualification is performed onsite.

  One significant improvement which has been achieved at TMI-1 is that formal qualification of Rad Con technicians has been accepted by the craft union and appears in the union contract job descriptions. These descriptions call for written examinations and periodic training, and allow reassignment out of the Rad Con Department for failure to progress. This important agreement on the part of the union could only have been obtained where strong management support for Rad Con was present.

- Radiological Assessment is performed at TMI-1 by an experience senior radiological control professional who reports directly to the Vice President and Director of Radiological Controls. The assessor has the assignment to monitor every phase of work at the site and to make his Rad Con reports directly to the Vice President. He has the authority to stop work which is unsafe or is not following procedures. The fact that it is rarely necessary for the assessor to formally exercise this authority to stop work is indicative of the respect with which he is regarded by the operations and maintenance people of TMI-1. Thus, this assessor represents another effective tool of management in support of Rad Con.

- **Radiological Engineering groups have been established at TMI and at corporate headquarters** to address technical problem areas in Radiological Safety. Their review of work packages at the site helps to ensure that proper consideration of radiological concerns is given before the work starts. This arrangement is much better than the alternative which is often used, wherein the radiological monitoring supervisory personnel take on these reviews as an added function.

- Radiological Deficiency Reports (RDRs) are now a part of the Rad Con system at TMI. Patterned after the Quality Assurance Deficiency Reporting system, which is one of the accepted parts of quality assurance, the RDRs can be issued by anyone who is in a position to observe violations of radiological control procedures or who wishes to make suggestions for improvements in this area.

  The procedure for handling the RDR requires that it be reviewed, evaluated, acted upon when indicated, and tracked through the entire process until final resolution. The originator is always informed of the actions taken on his report.

  The evidence of recent RDRs, received on the average of over ten per month, suggests that they are a particularly effective tool for increasing the awareness of all personnel at TMI-1 on the nature and importance of radiological controls.

- A Radiological Awareness Committee has been formed at TMI-1, consisting of senior management representatives of all TMI-1 divisions. They meet monthly to discuss problems and seek ways to improve the understanding of radiological controls at all levels.

The general employee does not have an appreciation of the problems of radiation and tends to think of the radiological control provisions as unnecessarily elaborate and meticulous. For that reason the system is not always wholeheartedly supported. The Committee's efforts have paid off in gaining greater support, as measured by reductions in the generation of radioactive waste and making more effective use of containments to restrict the spread of radioactivity during maintenance.

- Personnel Exposure Control has been upgraded by several procedures or systems that represent some of the more advanced ideas or techniques in Rad Con.

  (a) Any skin contamination detected is immediately evaluated and corrected. Records are kept and critiques held to discover root causes of the contamination and actions needed to correct them.

  (b) The radiation dosimetry program uses the latest state of the art equipment. This permits separate readings of beta and gamma radiation. These readings are entered into the company computer directly at the locations where dosimeters are read. Thus, the records are up-to-date for each day of work for every employee.

  (c) There is real-time radiation monitoring of the environmental radiation sensors permanently installed at 16 locations within a five-mile radius of TMI. The readings are fed to a computer which produces reports and alarms if elevated readings are detected. The state and county offices are also on this same automatic system.

The radiation control system in effect at Three Mile Island is a well-directed and effective approach to this important area. Management commitment to the goal of excellence is quite evident in the organizational position of Rad Con within the company structure, and in the choice of managers to carry out the program. These managers have set future goals for continuing improvement over the current highly acceptable record.

(5) The Importance of Training. After the technical design of the plant itself, the most important element in assuring reliable and safe operation of a nuclear power plant is the training of the crew who will operate the plant. A key indicator of management's understanding of safe nuclear plant operation is the degree to which high-level attention is given to training. Despite evidence from the Naval Nuclear Program as to its importance, this procedure had apparently not been widely accepted by the commercial nuclear power industry at the time of the TMI accident.

In the history of the Naval Nuclear Program, training was one of the early actions, even before many of the basic technical decisions had been made in the development and construction of the plant. This emphasis on early and thorough training of the crews of the nuclear submarines and surface ships made it possible to assign a fully-trained crew to operate the plant during every phase of construction and testing, including sea trials. Theretofore, the custom in shipbuilding had been to perform the tests and sea trial with a civilian trial crew. The naval crew took over after the trials, but lacked the valuable familiarity with the plant that operation in the testing period would have given them.

In 1979, before the TMI accident, training placed heavy reliance on the fact that considerable numbers of the operating and maintenance crews were former members of the Naval Nuclear Program. The basic training which those people had received in the Navy was useful in shortening the time needed to qualify them as commercial plant operators. In the many investigations which have been made into the training aspects of the TMI accident, it has been brought out that TMI training tended to concentrate on the narrow objective of getting the operators successfully through the NRC operator examination. If the NRC exam failed to cover all the elements of plant theory, safe operation, and casualty procedures, as applicable to the commercial plants, the training program might well miss them also.

At the time of the accident, there was only a small commitment of physical resources and operator time to training. Furthermore, the place of training in the organization was not high: the seven-person training organization reported to the Superintendent of Three Mile Island, competing for his attention with all of the problems of operating a site with 219 employees, one commercially operating nuclear power plant, and one plant in the final stages of start-up testing. Evidence of the secondary postion which training occupied can be found in the training attendance records at the time. Operational considerations prevented as much as 50% of the scheduled attendance at training lectures; those not attending were assigned take-home packages for self-study.

In the commercial nuclear power industry's analysis of the lessons of TMI, training has been identified as one of the key items needing greater management attention. The charter of the Institute of Nuclear Plant Operation (INPO) reflects this emphasis.

GPU Nuclear's upgrading of the corporate and TMI training program is quite dramatic. It reflects an unreserved determination by GPU management to create a training program second to none in the nuclear industry. The following paragraphs, which are only examples, illustrate the fundamental character of some of the improvements which have been made.

- Organization. With the organization of all nuclear activities of GPU into one company — the GPU Nuclear Corporation — direct responsibility for all nuclear plant training was assigned to the corporate level. The Corporate Director of Training reports to the Vice-President, Nuclear Assurance, a position now filled by the person who was directly responsible for organizing the upgraded training program at TMI. This position of high visibility for training meets the requirement that top management must be involved in and take responsibility for the proper training of nuclear plant personnel. Further, GPU Nuclear management has taken a positive position in favor of improved training facilities and personnel, and requiring the training organiation to be accountable for its performance.
- Facilities. A large new training building has been built at TMI with space for 16 classrooms, maintenance training labs, library, staff offices, and modern training aids, particularly in electronic and audio-visual equipment. Further training in maintenance and radiation control is done within the plant itself and in laboratory trailers adjacent to the plant.
- Staff. The training staff, which was only seven in number in 1979, has been expanded to 55, with further increases to 62 planned when the two nuclear simulators are installed at TMI. For operator training, licensed and unlicensed, the staff numbers 15. The remaining personnel are involved in the several other types of training which have been added to make this a complete training facility, such as maintenance, Rad Con, water chemistry, and general employee training.

  Not only has the number of training staff been increased, but also the quality of the instructors has been given critical attention. Considerable effort has gone into obtaining experienced instructors with background experience in the TMI plants or in other plants of a similar type. At present, four instructors in reactor operator training are licensed by NRC, two as Senior Reactor Operators (SRO) and two as Reactor Operators (RO). An Instructor Development Program is also in place. One objective is to have five operator instructors licensed as SROs on TMI-1, with completion expected in early 1984. A continuing program is in effect to ensure that the instructors advance in instructional skills and knowledge of their area of specialization. Similar expansions of staff, an upgraded program, and extensive new facilities were observed at Oyster Creek.
- Operator Training. One of the significant actions taken to enhance operator training by TMI management is the organization of operations personnel into six shifts. This permits training to be given to every operator for one full week in seven, a plan which substantially exceeds NRC training minimums. This is unusual in the industry, and is a good demonstration of the commitment of GPU Nuclear's management to become one of the best in training.

  There are other refreshing elements of management involvement in training, such as emphasis on manager-level training in nuclear theory, in the details of plant design, and in operation and maintenance. Managers also participate in the briefing of many of the cyclic training periods for each crew, and have become involved in simulator training at Babcock & Wilcox, Lynchburg, Virginia.
- Entry Level Training. TMI-1 management is changing its previous emphasis on the hiring of Naval Nuclear experienced personnel to fill vacancies in the operator ranks. They have found that both availability and retention of ex-Navy personnel is not promising in the long run. The competition for them is becoming ever greater as the presently programmed commercial nuclear plants come on line in the next five years. The program which has been started at TMI takes promising entry level operating people directly from high school. They will require two years to become auxiliary (non-licensed) operators and more years to qualify as control-room operators. Once the program is in place, and with careful guidance, it will give stability to that group for many years.
- Simulator Training. The program to install two simulators in the training facility at TMI is well underway. Basic Principles Simulators will be delivered in early 1984 to both TMI-1 and Oyster Creek; preparations at each site for using it in training are on schedule. This simulator does not duplicate the physical layout of the plant, but demonstrates its dynamics of operation; students can readily see the effects of changes which they can make at the control board, and become

intimately familiar with the principal plant variables, and the relationships between them.

The Replica Simulator for TMI-1, due to be in place at the end of 1985, is a physical duplication of the plant operating console and is controlled by sophisticated computer programs that will faithfully model the fundamentals of plant operations. It will duplicate a very wide variety of transient conditions with accurate representation of what the plant itself will do under the plant conditions and operator actions which are chosen. At the outset, the Replica Simulator will be able to model some 200 plant failure sequences, with the possibility of expanding, through additional programming, to 500 failure sequences.

Two of the most important and significant changes which have been made by General Public Utilities to upgrade the TMI-1 nuclear plant operations have been the formation of GPU Nuclear Corporation, with its centralized mode of management, and the upgraded training program which has been in place there. The management change is, indeed, part of the reason that such a large step increase in training could be made.

The management of the training activity at the TMI-1 plant fully meets the requirement that top managers be directly involved with the training activities in observing classes, setting high standards, providing resources, and monitoring the progress of the program to assure its continued performance and improvement.

(6) Concept of Total Responsibility. Operating nuclear plants safely requires adherence to a total concept wherein all functional elements which support operations are recognized as important and each is constantly reinforced. Even after each support function — technical, training, quality assurance, radiological control, maintenance, etc. — is adequately staffed and trained, they must be effectively integrated if they are to support sound operating decisions.

As pointed out elsewhere in this report, we found that a number of these support functions are believed by present managers to have been inadequately performed at the time of the accident. Beyond these individual inadequacies, we note also that the organization which existed in 1979 made it difficult for support functions to assist operations even if they had been adequate in themselves.

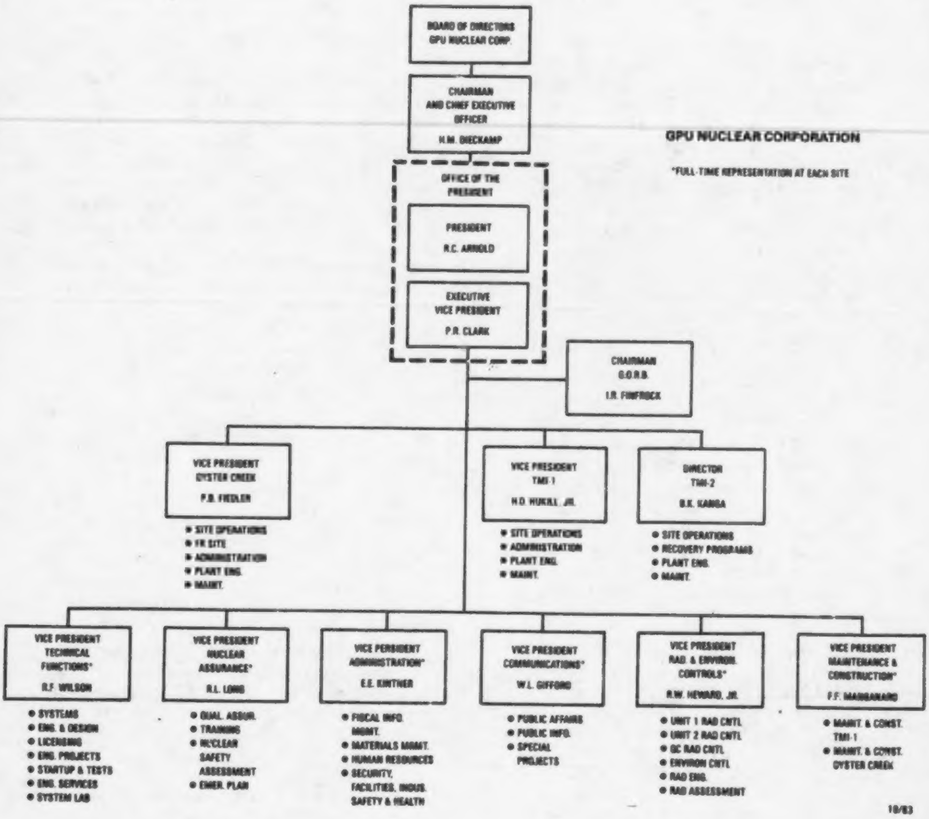
Some of the support required by operations, particularly technical support, was located outside the operating company, partly in GPU Service Corporation and partly in subcontractors, making effective integration all but impossible. In addition, most of the off-site line managers had responsibility for both fossil and nuclear generation and hence were unable to give undivided attention to managing and integrating all of the functions affecting their nuclear plants. Only the Station Manager had undivided responsibility, but he did not have and could not readily call upon all of the required supporting resources.

The inadequacies of the organizational structure existing in 1979 were beginning to be recognized before the accident. Following the accident, GPU took steps to create a single purpose, self-sufficient nuclear operating organization which embodies the concept of total responsibility and has the potential to achieve it. Unlike the 1979 organization, in which three organizational levels separated the off-site President of the operating company from the TMI-1 on-site Superintendent, the present GPU Nuclear organization has the individual responsible to operate TMI-1 reporting directly to the off-site President. The latter has a full range of supporting staffs and only nuclear responsibilities. A current organization chart is shown on the following page.

The concept of total responsibility and the capability to achieve integrated decision-making are enhanced by having all necessary supporting resources available within the GPU Nuclear Corporation, where they report either to the on-site Vice President TMI-1, or to his immediate superior. The support services which report to that immediate superior have on-site units to assure that each service is conveniently accessible at the scene of operation and that it participates effectively in reaching integrated operating decisions.

We believe the the present GPU Nuclear organizational structure is soundly conceived to attain integrated decision-making. The importance which management attaches to the support functions is demonstrated by placing them directly under the President, with Vice-Presidential status. The central importance of Operations and the support which it must have is maintained by assigning an individual of Vice-President level to manage the site and by giving him on-site access to all necessary support.

The views expressed above are evident merely from a careful review of GPU Nuclear organization charts, but charts do not explain how organizations operate in practice. Through intensive interviews, the assessment team looked for objective evidence that the potential for integrated decision-making is actually being realized. We were interested to know whether the on-site units representing corporate level support groups recognize that their sole purpose is to support safe operations. We asked whether the on-site units bring the help of specialized corporate personnel to the site and involve them constructively in assisting Operations. We in-


BOARD OF DIRECTORS
GPU NUCLEAR CORP.
CHAIRMAN
AND CHIEF EXECUTIVE
OFFICER
H.M. DIECKAMP
OFFICE OF THE
PRESIDENT
PRESIDENT
R.C. ARNOLD
EXECUTIVE
VICE PRESIDENT
P.R. CLARK
CHAIRMAN
G.O.R.B.
I.R. FINFROCK
VICE PRESIDENT
OYSTER CREEK
P.B. FIEDLER
● SITE OPERATIONS
● FR SITE
● ADMINISTRATION
● PLANT ENG.
● MAINT.
VICE PRESIDENT
TMI-1
H.D. HUKILL, JR.
● SITE OPERATIONS
● ADMINISTRATION
● PLANT ENG.
● MAINT.
DIRECTOR
TMI-2
B.K. KANGA
● SITE OPERATIONS
● RECOVERY PROGRAMS
● PLANT ENG.
● MAINT.
VICE PRESIDENT
TECHNICAL
FUNCTIONS*
R.F. WILSON
● SYSTEMS
● ENG. & DESIGN
● LICENSING
● ENG. PROJECTS
● STARTUP & TESTS
● ENG. SERVICES
● SYSTEM LAB
VICE PRESIDENT
NUCLEAR
ASSURANCE*
R.L. LONG
● QUAL. ASSUR.
● TRAINING
● NUCLEAR
SAFETY
ASSESSMENT
● EMER. PLAN
VICE PERSIDENT
ADMINISTRATION*
E.E. KINTNER
● FISCAL INFO.
MGMT.
● MATERIALS MGMT.
● HUMAN RESOURCES
● SECURITY,
FACILITIES, INDUS.
SAFETY & HEALTH
VICE PRESIDENT
COMMUNICATIONS*
W.L. GIFFORD
● PUBLIC AFFAIRS
● PUBLIC INFO.
● SPECIAL
PROJECTS
VICE PRESIDENT
RAD. & ENVIRON.
CONTROLS*
R.W. HEWARD, JR.
● UNIT 1 RAD CNTL
● UNIT 2 RAD CNTL
● OC RAD CNTL
● ENVIRON CNTL
● RAD ENG.
● RAD ASSESSMENT
VICE PRESIDENT
MAINTENANCE &
CONSTRUCTION*
F.F. MANGANARO
● MAINT. & CONST.
TMI-1
● MAINT. & CONST.
OYSTER CREEK

GPU NUCLEAR CORPORATION

*FULL-TIME REPRESENTATION AT EACH SITE

10/83

quired whether the on-site groups are a team, working together to achieve safe operation, or whether they tend to be bureaucratic and self-centered.

From interviews at both stations, we learned that safe operations is recognized to be the central and dominant objective and that doing what must be done to achieve it is more important than who does it or who gets credit. There is a strong sense of "team" at both sites. Numerous examples, a few of which are noted here, show that this is an operative concept:

- At both TMI-1 and Oyster Creek, there is an established practice by which support service managers (quality assurance, radiological control, maintenance, training, etc.) make regular plant tours on the night shifts to see how their procedures are being carried out and to show their interest in operating problems. Written reports are made to the Site Manager.
- TMI-1 has a practice by which senior site managers, including support managers, regularly attend shift turnover meetings. This demonstrates the total responsibility concept.
- We noted that Operations Managers, including the Vice-President, conduct briefings of shift crews during each cyclic training.
- Team attitudes at the operating sites are so strongly developed that Operations Managers derive support from the service groups, while being free of the burden of their administration. This allows Operations Managers to concentrate on operations.
- It was evident to the assessment team that the Concept of Total Responsibility found at the plant sites is reflected also in corporate headquarters. By receiving information from site operations and on-site service units, corporate managers are tightly knit into operating affairs and are enabled to make informed, integrated operating policies and decisions.

The assessment team concludes that the present GPU Nuclear organization, in contrast with the organization in use in 1979, reflects an understanding of the concept of total responsibility and integrated decision-making. We observed that these concepts are practiced at both the station and corporate levels.

(7) Capacity to Learn from Experience. Since we are dealing with people and machines which cannot be made perfect, it is important to recognize that mistakes will be made. We must design machines having tolerance for mistakes, and we must improve them through experience. A capacity to acknowledge mistakes and to search out and correct their underlying causes is essential to nuclear operations.

The assessment team explored two interrelated areas of activity in order to assess GPU Nuclear's capacity to learn from experience. First, we inquired whether management has policies requiring that they be informed regularly of problems discovered at lower levels. Are there clear, accepted methods for reporting problems upward? Are they regularly used, and do individuals perceive a management which not only insists on knowing, but also acts on that knowledge?

Second, we inquired whether management's record of responses to past problems reveals an inclination to apply superficial remedies or whether the record shows diligence in determining and correcting root causes. For this second area, the assessment team examined the actual responses which the company had made to the management lessons of the TMI-2 accident. We used for this test several of the principal management lessons and recommendations found in the Kemeny and Rogivin reports. Our purpose was to note whether the recommendations had been responded to at all, and more importantly, whether the responses were thoroughgoing remedies designed to deal with the root causes of the problems defined.

With respect to the first area, management has instituted a number of practices since the accident whose purpose is to assure that significant problems are identified and reported upward to the required management level for solution. Some of these are described in the following paragraphs:

- Each Station Vice President and each Support Division Vice President sends a personal, bi-weekly Significant Events Report to the President, GPU Nuclear, with copies to the GPU Chairman and the GPU President. These reports are five to ten pages, succinctly written, and emphasize problems.
- Each Station has an established plant procedure for handling unusual operating incidents or findings. These procedures include specific requirements to prepare written reports, investigate causes, review the incident with personnel from all shifts, and incorporate lessons learned in the Operator Training Program. Each such report is also sent for review to the Independent On-site Safety Review Group.
- Each Station is assigned a Safety Review Manager with a broad charter and full access to monitor safety practices. This manager reports to the Nuclear Safety Assurance Department at corporate headquarters.
- Each Station is assigned a Radiological Assessor with responsibility to observe and monitor radiological control practices. He reports to the Vice-President, Radiological Control, at corporate headquarters.
- TMI-1 has assigned an independent quality assurance engineer on shift to monitor TMI-1 operations and to report his observations, outside the operations chain, to the Quality Assurance Manager.

- Finally, with respect to management policies concerning upward reporting of problems, we find that the following quoted passage is instructive. It is taken from an Administrative Procedure titled *Conduct of Operations*. At TMI-1 the procedure number is 1029, and at Oyster Creek the procedure number is 106. In both cases the same language appears, instructing Shift Supervisors regarding their responsibility to report a potential threat to public safety. The passage follows:

> "An essential element of protection of public health and safety is timely notification of State, local, NRC and Company officials in the event of an accident. There should be no reluctance on your part to initiate the notifications called for by the Emergency Plan if conditions indicate a potential threat to public health or safety even if more evaluation is necessary to confirm the existence of such a threat."

The instruction goes on to state certain governing principles:

- "Promptly report all facts and other information concerning plant conditions and the potential threat to the public.
- "Be thoroughly and totally candid, and do not withhold any information.
- "Answer any questions to the best of your ability, whether or not they appear to you to be pertinent to the situation at hand.
- "Make every reasonable effort to convey information so that the recipients have an understanding of the significance of the report including the degree of uncertainty that may exist as to plant conditions and the prospect for further degradation in the situation."

From these examples of current practices and from discussions of upward reporting attitudes during interviews, the assessment team is convinced that GPU Nuclear has established the importance of candid problem-reporting and has effective practices in use which do it.

We turn now to the second area of exploration to ask what kind of actions are taken once a problem is identified, and particularly whether the remedies are thoroughly responsive to the full scope of the problem. This is intended to assess whether, in practice, GPU Nuclear displays a capacity to learn from experience. In the following paragraphs we use examples of some of the principal management-related lessons and recommendations drawn from the Kemeny and Rogovin Reports:

> "Therefore, the industry must also set and police its own standards of excellence to ensure the effective management and safe operation of nuclear power plants." (Kemeny, page 68, para. B.1)
>
> "...many utilities apparently regarded bare compliance with NRC minimum regulations as more than adequate for safety." (Rogovin, page 90)

The assessment team addressed management's attitude toward exceeding minimum standards in Section III-B(1), titled "Rising Standards of Adequacy." We found that GPU Nuclear consistently sets and polices its own standards of performance, and that in many cases these exceed regulatory requirements.

> "There must be a systematic gathering, review, and analysis of operating experience at all nuclear power plants coupled with an industry-wide international communications network to facilitate the speedy flow of this information to affected parties." (Kemeny, page 68, para B.1.b)

The Institute of Nuclear Power Operations has established two industry-wide information collecting and dissemination systems for operating experience. One is called Significant Event Evaluation and Information Network (SOER). Both TMI-1 and Oyster Creek are participating effectively in this program. The other program, designed to collect equipment reliability information, is called Nuclear Plant Reliability Data System (NPRDS). Neither TMI-1 nor Oyster Creek is yet fully operational for routine interactive data entry and use, although both advised the assessment team that they expect to reach that goal with the next few months.

> "We recommend that each nuclear power plant company have a separate safety group that reports to high-level management." (Kemeny, page 63, para. 3.2)

GPU Nuclear Corporation has established a Nuclear Safety Assurance Department and staff at corporate headquarters, reporting to a Vice President. At each station there is an Independent On-Site Safety Review Group, reporting to Nuclear Assurance at headquarters, and a separate Plant Review Group, reporting on-site, responsible to supervise formal safety reviews of technical specification, operating procedure, or design changes, on behalf of the Station Manager.

In addition, there are high-level General Office Review Boards for each station, having outside as well as inside members, with responsibility to overview, assess, and report to the Chief Operating Officer and the Board of Directors on signifcant matters affecting safety.

> "...there must be a single accountable organization with the requisite expertise to take responsibility for the integrated management of the design, construction, operation, and emergency response functions, and the organizational entities that carry them out." (Kemeny, pages 68 and 69, para. B.3)
>
> "We have found an industry in which the expertise and responsibility for safety is fragmented among many parties..." (Rogovin, page 30)

The assessment team has discussed the present "single accountable organization" under the preceding section III-B(6), titled "Concept of Total Responsibility," and has contrasted that organization (GPU Nuclear) with conditions prevailing in 1979. In constructing this present organization, GPU Nuclear has taken full account of the lessons of experience. The organization includes units at headquarters and at each station responsible for operations, technical functions, nuclear safety assurance, radiological controls, maintenance and construction, training, and quality assurance. Managers, technical and professional personnel, and licensed operators now assigned to TMI-1 number 442 persons; at the time of the accident, the corresponding number was 127.

> "The kinds of changes needed...include...new programs for improved operator training... and...that qualified engineer supervisors...will be a part of...every reactor operating shift." (Rogovin, page 90)
>
> "Each utility should have ready access to a control room simulator. Operators and supervisors should be required to train regularly on the simulator." (Kemeny, page 71, para 3.d)

GPU Nuclear's response to these lessons and recommendations are:

New, well-equipped, contiguous training centers have been constructed at both TMI-1 and Oyster Creek. Basic Principles Simulators are on order for each station, a Replica (control room) Simulator is on order for TMI-1, and a Replica Simulator is in budget plans for Oyster Creek.

Shift Technical Advisors, each a degreed engineer, are assigned to each operating shift.

The assessment team believes that GPU Nuclear practices effective upward problem reporting. The management has demonstrated the capacity to learn from past experience and continues to learn from experience. The assessment team found abundant evidence that this vital operating principle is understood and practiced at all levels.

IV. Conclusions and Recommendations.

A. Conclusion. Based on the assessment of the GPU Nuclear Corporation organization and its senior management as reported herein, the team concludes that GPU Nuclear Corporation has the management competence and integrity to safely operate the TMI-1 plant.

B. Recommendations. In the course of the investigation, several items were observed which, if adopted, would enhance the operation of the TMI-1 plant. While they are not considered necessary prior to restart, the team recommends they be adopted.

1. GPU Nuclear should devise a plan to upgrade the operation and support of the TMI-1 and Oyster Creek plants, to achieve a ranking in the top one-sixth of all commercial nuclear plants in the Institute of Nuclear Power Operations (INPO) evaluations. Milestones should be set in each area and progress measured against these milestones.

2. GPU and GPU Nuclear senior management should become technically informed and personally familiar with conditions at the operating plant. They should visit the plants frequently, at irregular hours, inspect selected portions, and leave a written record of what they observed and how long they remained.

3. .Some personnel in the TMI-1 Training Department responsible for training licensed operators are not yet qualified Senior Reactor Operators. We recommend that these personnel complete qualification procedures as soon as possible.

4. GPU Nuclear should continue to reduce its dependence on the use of consultants. The organization should become self-sufficient to the point where use of such personnel would be necessary only in special circumstances where development of in-house capability could not be justified.

5. The general announcing system for the TMI plant distracts personnel in the control room. The system should be modified to significantly reduce these broadcasts to the control room. This will prevent distraction of operators from their primary duties. Also, too many people are in the control room. Only those essential to the operation of the plant should be there. Instructions to this effect should be posted and complied with.

Appendix A

Documents Reviewed

1. Organization Plan, GPU Nuclear Corporation.
2. Biographies of all senior officials of the GPU Nuclear Corporation.
3. Letter from Mr. H. M. Dieckamp, dated September 12, 1980, initiating the GPU Nuclear Corporation.
4. Results of Faegre & Benson Investigation of Hartman Allegations, dated September 17, 1980.
5. Testimony of Mr. R. C. Arnold before the Atomic Safety and Licensing Board (ASLB) in December 1980.
6. GPU Accident Task Force, Final Summary Report, dated December 15, 1980.
7. Metropolitan Edison memo, "Off Shift Tours by Senior Management," dated January 20, 1981.
8. ASLB Partial Initial Decision (Procedureal Background and Management Issues), dated August 27, 1981.
9. ASLB Report of the Special Master, dated April 28, 1982.
10. ASLB Partial Initial Decision, dated July 27, 1982.
11. GPU Nuclear's Operational Quality Assurance Plan for TMI-1 and Oyster Creek, dated September 1, 1982.
12. Memorandum on Management Escalation Program for Quality Assurance Deficiencies, dated October 4, 1982, signed by H. Hukill and B. K. Kanga.
13. Report of the Nuclear Regulatory Commission (NRC) Systematic Assessment of Licensee Performance (SALP) of TMI Unit 1, dated November 22, 1982.
14. GPU Annual Report for 1982.
15. TMI Fact Book, dated February 7, 1983.
16. Basic Energy Technology Associates (BETA) Report on GPU Nuclear, dated February 28, 1983.
17. Institute of Nuclear Power Operations (INPO) Evaluation of Oyster Creek Nuclear Generating Station, dated March 1983.
18. Affidavit by R. Parks, March 1983.
19. Rohrer, Hibler, and Replogle, Inc. (RHR) Consultation with GPU Nuclear Management, dated March 15, 1983.
20. GPU Nuclear Corporation Audit Report S-TMI-83-02, Safety Review Program, dated March 21, 1983.
21. News Release on R. Parks (by Government Accountability Project [GAP]), dated March 22, 1983.
22. GPU Nuclear Corporation Audit Report S-TMI-83-03, TMI-1 Drawing Control, dated March 22, 1983.
23. Memo responses to Audit S-TMI-83-03, dated April 13, 1983.
24. Prepared Statement of R. Parks, dated April 22, 1983.
25. Letter to Secretary of Labor from Thomas Devine, GAP, re: Parks, dated April 22, 1983.
26. Griebe-Lowe Report on King Allegations, dated April 25, 1983.
27. Those portions of the Statements of GPU Nuclear Corporation before the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington DC, made April 26, 1983, discussing the status and actions required for TMI Unit 1 restart.
28. Congressional Testimony of Lawrence P. King, dated April 26, 1983.
29. Prepared Statement by L. P. King, dated April 26, 1983.
30. Report of Joint NRC Headquarters/Regional Inspection of TMI-1, No. 50-289/83-10, made April 20-28, 1983, to evaluate the effectiveness of GPU actions to ensure adherence to procedures at TMI Unit 1.

31. "Nuclear Personnel Training After TMI-2: The GPU Nuclear Response," by R. L. Long, et al., dated May 1983.
32. Evaluation by the INPO of TMI Unit 1, made May 9-16, 1983.
33. RHR Clarifying Letter to GPU Nuclear, dated May 13, 1983.
34. BETA Clarifying Letter to GPU Nuclear, dated May 13, 1983.
35. GPU Response to Griebe-Lowe Report, dated June 8, 1983.
36. TMI-1 General Office Review Board (GORB) Restart Review Subcommittee Final Report, dated June 10, 1983.
37. H. M. Dieckamp letter to NRC Chairman N. J. Palladino, dated June 10, 1983.
38. Memorandum from NRC Commissioner V. Gilinsky for the Parties in the Three Mile Island Unit 1 Proceeding, dated June 22, 1983.
39. NRC Memorandum on Licensee's Obligation to Report the BETA and RHR reports, dated June 22, 1983.
40. TMIA Interim Comments on Babcock & Wilcox Trial Record, dated July 1, 1983.
41. Memo responses to Findings 2, 4, and 12 of Audit Report S-TMI-83-02, dated July 12, 1983.
42. Memorandum concerning Technical Function Safety Reviewers, dated July 13, 1983.
43. H. M. Dieckamp response to letters from Sen. J. Heinz (Pennsylvania) and Rep. Goodling concerning Restart of TMI-1, dated July 13, 1983.
44. TMI-1 Restart Readiness Prerequisite Listing, Rev. 3, dated July 21, 1983.
45. GPU Nuclear Response to BETA recommendations, dated July 26, 1983.
46. GPU's response to Commissioner V. Gilinsky's memorandum, dated August 4, 1983.
47. Interim Report, GORB OTSG Subcommittee, dated August 16, 1983.
48. GPU Nuclear corporation Audit Report S-TMI-83-07, Corrective Action Program, dated August 16, 1983.
49. Interim Report concerning OTSG Repair, dated August 18, 1983.
50. Monthly report of Quality Assurance Manager to Vice-President/Director of TMI-1, dated September 1983.
51. TMI-1 Steam Generator Repair Safety Evaluation Report, NUREG-1019, dated September 1, 1983.
52. NRC Interim Report of TMI-2 Allegations regarding Safety Related Modifications and Quality Assurance Procedures, dated September 1, 1983.
53. NRC Report of Investigation regarding Parks Allegations, TMI-2, dated September 7, 1983.
54. TMI-1 Administrative Procedure No. 1029, Rev. 11, Conduct of Operations, dated September 15, 1983.
55. GPU Nuclear Response to TMIA Interim Report, dated September 22, 1983.
56. Letter from Edwin H. Stier to R. C. Arnold, re: Parks, King, Gischel, dated September 23, 1983.
57. GPU v. Babcock & Wilcox Lawsuit Review and Its Effect on TMI-1, NUREG 1020 (draft), dated September 28, 1983.
58. Memorandum from Commissioner V. Gilinsky to the Commissioners concerning the Future of Three Mile Island Unit 1, dated September 28, 1983.
59. NUREG 1020, Public Version, GPU v. Babcock & Wilcox, dated October 1983.
60. TMI Quality Assurance Organization Chart, Rev. 2, dated October 3, 1983.
61. NRC Memorandum on Its Review of GPU v. Babcock & Wilcox Lawsuit, dated October 3, 1983.
62. Licensee's Response to Commission Order of October 7, 1983, with 11 attachments.
63. NRC Order to Stay Hearing on Hartman, dated October 7, 1983.
64. NRC Notice to the Parties concerning time to complete review of issues that might affect decision to restart TMI-1, dated October 7, 1983.
65. GPU's Response to NUREG 1020 (by H. M. Dieckamp), dated October 14, 1983.

66. GPU Nuclear's TMI 1983 Annual Quality Assurance Assessment, dated October 17, 1983.
67. Organization chart, TMI Training, dated October 17, 1983.
68. TMI-1 Plant Status Report for period October 15-28, 1983, H. Hukill to R. C. Arnold/P. R. Clark, dated November 1, 1983.
69. Memo, Licensed Instructors for TMI-1 Operator Training, dated November 1, 1983.
70. "Quality Assurance Verification of Important to Safety Plant Activities," J. C. Fornicola, B. E. Ballard, presented at Tenth National Conference, ASQC.
71. "Important to Safety and the Graded Approach," B. E. Ballard and N. C. Kazanas (undated).
72. GPU Nuclear Radiological and Environmental Controls Organization Plan (undated).
73. Position Descriptions: Radiological Engineering Manager, Radiological Engineer, and Radiological Assessor.
74. Estimated Resources (Personnel) Applied to TMI-1 as of 3/79, dated October 21, 1983.
75. GPU Nuclear Corporation Organization Chart showing Resources (Personnel) Applied to TMI-1, as of June 27, 1983.
76. Oyster Creek Operating Procedures
    - No. 105—Conduct of Maintenance, Jan. 7, 1983
    - No. 106—Conduct of Operations, June 16, 1983
    - No. 106.4—Conduct of Radwaste Operations, Feb. 16, 1983
    - No. 106.5—Plant Status Control, Feb. 16, 1983
    - No. 106.6—Conduct of Chemistry Operations, June 1, 1983
    - No. 107—Procedure Control, Apr. 14, 1983
    - No. 108—Equipment Control, Jan. 7, 1983
    - No. 108.1—Radwaste, Off Gas and Boiler House Equipment Control, Jan. 27, 1983
    - No. 124—Plant Modification Control, Oct. 18, 1983
77. INPO Memorandum Report, Visit to Oyster Creek Nuclear Generating Station, dated October 26, 1983.
78. GPU Nuclear Status Report for Oyster Creek INPO Evaluation, Memo signed by P. B. Fiedler, dated October 25, 1983.
79. Organization Chart, Oyster Creek Quality Assurance Unit.
80. Organization Chart, Oyster Creek Training Department.
81. Organization Table, Oyster Creek Division, GPU Nuclear.
82. INPO Follow-Up on INPO Programs, CEO Workshop, dated September 1983.
83. GPU Nuclear "R" and "NR" Certification by the National Board of Boiler and Pressure Vessel Inspectors, dated April 5, 1983.
84. Corporate In-Service Inspection (ISI) Program Draft, dated October 24, 1983.
85. Corporate Weld Program and GPU Nuclear Welding Manual, dated February 1983.
86. TMI Administrative Procedure 1042, Control of Welding, dated March 3, 1983.

Appendix B

Persons Interviewed

GPU Nuclear Management

- R. C. Arnold
  - President and Chief Operating Officer (GPU Nuclear)
- T. G. Broughton
  - Director, Systems Engineering
- P. R. Clark
  - Executive Vice President
- H. M. Dieckamp
  - Chairman and Chief Executive Officer (GPU Nuclear)
- R. W. Heward
  - Vice-President/Director, Radiological & Environmental Controls
- N. C. Kazanas
  - Director, Quality Assurance
- R. W. Keaten
  - Director, Engineering Projects
- E. E. Kintner
  - Vice-President/Director, Administration
- W. G. Kuhns
  - Chairman and Chief Executive Officer (GPU)
- R. L. Long
  - Vice-President/Director, Nuclear Assurance
- F. F. Manganaro
  - Vice-President/Director, Maintenance & Construction
- R. N. Whitesel
  - Vice-Chairman, General Office Review Boards, and Manager, Nuclear Safety Assurance Department
- R. F. Wilson
  - Vice-President/Director, Technical Functions

TMI-1 Management

- B. E. Ballard
  - Manager, Quality Assurance
- E. J. Brown
  - Administrative Support, Training
- R. Campbell
  - Reactor Operator
- J. J. Colitz
  - Plant Engineering Director
- R. F. Fenti
  - Quality Control Manager
- R. R. Harper
  - Corrective Maintenance Manager
- H. D. Hukill
  - Vice-President, TMI-1
- C. A. Irizarry
  - Simulator Development and Training
- G. A. Kuehn
  - Manager, Radiological Controls
- B. P. Leonard
  - Operator Training Manager
- M. A. Nelson
  - Plant Review Group Chairman
- S. L. Newton
  - Manager, Plant Training
- L. G. Noll
  - Shift Supervisor
- V. P. Orlandi
  - Lead I&C Engineer
- M. J. Ross
  - Manager, Plant Operations
- O. J. Shalikashvili
  - Deputy Manager, Plant Training
- R. P. Shaw
  - Radiological Engineering Manager
- D. M. Shovlin
  - Manager, Plant Maintenance
- D. Smith
  - Senior Reactor Operator
- M. G. Snyder
  - Preventive Maintenance Manager
- R. J. Toole
  - Manager, Operations and Maintenance
- R. W. Zechman
  - Technician Training Manager
- W. H. Zewe
  - Radwaste Operations Manager

Oyster Creek Management

Frank Ciganik
    Group Shift Supervisor
P. B. Fiedler
    Vice-President, Oyster Creek
David Gaines
    Manager Plant Training
Edward Growney
    Safety Review Manager
Thomas Lonsdale
    Control Room Operator
J. P. Maloney
    Manager Plant Material
Ray Markowski
    Manager Site Audit
Robert McKeon
    Manager Plant Operations
William Popov
    Manager of Maintenance and Construction
Clark Tracy
    Quality Assurance Manager
Douglas Turner
    Manager Radiological Control
W.J. Smith
    Plant Engineering Director
J. L. Sullivan, Jr.
    Plant Operations Director

Appendix C

Assessment Team Members

James M. Dunford

Consultant. Pioneer in Navy nuclear propulsion program from 1946 to 1965. Participated in USS Nautilus and USS Seawolf design and Nautilus prototype construction at Arco, Idaho. Six years Deputy Assistant Director Naval Reactors, Atomic Energy Commission, responsible under the Assistant Director for all training matters in the Naval nuclear program. Member of Advisory Board for Oak Ridge School of Reactor Technology. Recording Secretary for Atomic Energy Commission's Reactor Safeguards Committee, Dr. E. Teller, Chairman. Two years Special Assistant to Atomic Energy Commissioner Thomas E. Murray for commercial nuclear power matters; Vice-President of New York Shipbuilding Company, responsible for building and testing three submarines and a cruiser for the U.S. Navy. Professor of Mechanical Engineering (Nuclear Power), University of Pennsylvania. Technical Director, Naval Air Engineering Center, Philadelphia, Pennsylvania.

B.S., U.S. Naval Academy, 1939; S.M., Naval construction and Engineering, Massachusetts Institute of Technology, 1944; Graduate, Oak Ridge Training School, 1947.

Jack C. Grigg

Graduated Texas Tech University with B.S. in electrical Engineering, 1941. Employed Westinghouse Electric Corporation in design of electric equipment, 1941-42. Employed in Electrical Branch, Navy Bureau of Ships, under supervision of then Commander H. G. Rickover, in design of electric control equipment for ships, 1942-52. Employed as Director, Nuclear Control and Instrumentation Division, Bureau of Ships, and Chief, Nuclear Controls and Instrumentation Branch, Naval Reactors Division, U.S. Atomic Energy Commission, responsible for all aspects of instrumentation and control for nuclear propulsion plants for Navy ships and the Shippingport Atomic Power Station, 1952-78. During this period, participated in the interviews of hundreds of Navy officers being selected to enter the nuclear propulsion program; headed teams of Naval Reactors personnel conducting examinations of ships engineering personnel; acted as principal assistant to Admiral Rickover in conducting initial sea trials of nuclear ships. Self-employed as Consulting Engineer, 1979 to date. Participated in design reviews of overall plant control of the Clinch River Liquid Metal Fast Breeder Reactor Plant. Particpated in review of and made recommendations for the correction of scram circuit breaker problems in the Salem Nuclear Power Station.

Robert V. Laney

Consultant, Energy Project Management; former Deputy Director, Argonne National Laboratory; Vice-President and General Manager, Quincy Shipyard Division, General Dynamics; Atomic Energy Commission and Bureau of Ships Technical Representative at Westinghouse Bettis Atomic Power Laboratory; Project Manager, Naval Reactors Program, Atomic Energy Commission and Bureau of Ships. Ch. Engineering Review Team, Washington State Public Power Supply System; Member Commonwealth Edison Ad Hoc Advisory Committees on Three Mile Island; Consultant, Design Verification, Houston Lighting and Power Company; Ch. Technical Audit Associates Design and Construction Audit Team, WPPSS WNP-2. Consultant Battelle Northwest Laboratories; Department of Energy; Argonne National Laboratory.

B.S., U.S. Naval Academy; M.S., Massachusetts Institute of Technology; M.B.A., University of Chicago.

FOLLOW-UP REPORT

# of Assessment of the GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1

by

Admiral H. G. Rickover

19 April 1984

Preface

On 16 and 17 April 1984, my associates and I made a thorough inspection of GPU Nuclear Corporation's undamaged Three-Mile Island plant (TMI-1). This was a follow-up of a previous study and assessment of the management of that plant, the results of which are presented in my report, "Assessment of the GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1," dated 19 November 1983.

Based on the assessment of the GPU Nuclear Corporation organization and senior management which I reported in November 1983, the team had concluded that GPU Nuclear Corporation had the management competence and integrity to safely operate the TMI-1 plant. As further indicated in that report, several recommendations were made which, if adopted, would enhance operation of the TMI-1 plant. While they were not considered essential prior to restart, I recommended they be adopted.

The recommendations of the November 1983 report were adopted by Mr. William G. Kuhns, Chairman of the Board, GPU. Particular attention was therefore given in this return visit to actions which have been taken by the GPU Nuclear management in implementing those recommendations.

As reported herein, the 17 April 1984 review of GPU Nuclear Corporation actions at TMI-1 reveals that the Corporation has made significant and noteworthy progress toward adoption of the recommendations of the earlier report. The Corporation has also strengthened its top management by restructuring its Board of Directors to include Board members from outside the Corporation, with particular technical experience and expertise in the nuclear-power field.

These actions of the GPU Nuclear Corporation management give further evidence of their competence to safely restart and operate the plant.

At the time of the present visit, permission to restart the plant had not yet been made by the Nuclear Regulatory Commission.

This decision has already taken too long. Additional studies or deliberations are not necessary to resolve this matter. Havering by a responsible government agency can cause delay and results in discouragement of those who are technically and financially responsible for the operation of our nuclear facilities. I strongly recommend that GPU Nuclear Corporation be authorized to operate TMI-1 without further delay.

H. G. Rickover.
H. G. RICKOVER
19 April 1984

I. Introduction

In the report "An Assessment of the GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1," by Admiral H. G. Rickover, dated 19 November 1984, five recommendations were made which, if adopted, would enhance the operation of the TMI-1 plant.

On 16 and 17 April 1984, the same review team revisited Three Mile Island to assess the action by GPU Nuclear Corporation on each of these recommendations.

A review of each recommendation, together with the action taken by the corporation, is contained in the following sections of the report.

II. Recommendations and Actions

A. Recommendation:

"GPU Nuclear should devise a plan to upgrade the operation and support of the TMI-1 and Oyster creek plants, to achieve a ranking in the top one-sixth of all commercial nuclear plants in the Institute of Nuclear Power Operations (INPO) evaluations. Milestones should be set in each area and progress measured against these milestones."

Action:

GPU Nuclear Corporation has wholeheartedly accepted this recommendation and has set it as its top objective for 1984. The goal of achieving a ranking in the top sixth of nuclear plants evaluated by INPO has been set for TMI-1 for this year, but the goal has been expanded to include a top ranking in the several evaluations made by federal and state regulatory bodies.

The earning of this reputation as a leader among nuclear utilities is expressed in a set of goals which each of the GPU Nuclear divisions has adopted. These goals, in turn, have been expanded by more detailed goals, milestones, and progress reviews applying to each of the two nuclear plants.

Our review noted that the detailed set of individual goals covered all activities important in evaluating a nuclear power plant operation. Each element of the organization had goals. We checked a number of milestones set to achieve these goals against the record of actual accomplishment. The record shows a high degree of commitment on the part of managers and supervisors toward meeting the milestones and, through those actions, in achieving the goal. The team is well aware that top management can easily set goals and objectives which may not be met unless the lower echelons of the organization are also working earnestly toward these same goals.

It was this spirit of dedication we looked for in talking with those at various levels in the organization. It is our judgment that management has achieved this most important spirit of dedication on the part of its employees.

In the five months since our last inspection of the TMI-1 plant, not one person in the Operations Division has resigned. We found a pride among the employees in the organization which is indicative of the leadership of TMI-1 managers and supervisors.

A recent replacement of one of the main coolant pumps, a very complex operation, was undertaken by the TMI-1 plant organization using its own employees throughout the six-week task. An operation of this magnitude might, under a less committed management and employees, have been assigned to an outside contractor. However, the TMI-1 employees took on this task with pride, thus demonstrating the present capability of the organization.

Examples of this kind are the best evidence of the desire of all employees to achieve the goal of excellence.

Conclusion:

Based on the above, we believe that the goal of receiving a ranking in the top group of nuclear plants can be achieved in the year 1984.

B. Recommendation:

"GPU and GPU Nuclear senior management should become technically informed and personally familiar with conditions at the operating plant. They should visit the plants frequently, at irregular hours, inspect selected portions, and leave a written record of what they observed and how long they remained."

Action:

GPU Nuclear Corporation has taken action to keep top management currently and technically informed on operations and problems. An indication of this is the reorganization of the Board of Directors to include members from outside the corporation. These will bring technical knowledge and experience in the nuclear power field to the corporation.

The Board of Directors now has a committee of three of these outside members called the Nuclear Safety Compliance Committee. This provides an additional knowledgeable review on the essential requirement for safety in plant operations.

In furtherance of its commitment to a technically well-informed top management, GPU Nuclear has initiated a detailed program, including the following:

1. Training.

   a. The President and the Executive Vice President are presently taking instruction to qualify as Emergency Support Directors for TMI-1 and Oyster Creek. This program, which includes extensive technical training, is scheduled to be completed in 1984.

   b. The Director of the TMI-1 plant participates in at least one week of simulator training per year and in a minimum four hours of formal planned operations training per month.

   c. All senior technical managers who have not already completed Emergency Support Director training for both TMI-1 and Oyster Creek will do so.

2. Methods by which senior management keep aware of plant problems.

   a. The President reviews the Weekly Significant Event Reports from the plant and each support division. He also reviews the Daily Operations Status Reports and the Plant Deficiency Reports.

   b. The Director of the TMI-1 plant and his Chief Assistants attend the 4:00 p.m. change of off-going and on-coming shifts to receive first-hand information on the condition of the plant. He is of course kept advised at all times of unusual plant conditions as they occur.

c. All Directors conduct frequent staff meetings. They also review the Weekly Significant Events Reports.

3. Plant tours:

a. The GPU Nuclear President and the Executive Vice President make at least nine unannounced tours per year and submit written reports of their observations to those responsible.

b. The Director of the TMI-1 plant makes at least two unannounced plant tours each week.

c. All plant managers (including support divisions) will conduct off-shift tours on a rotating schedule and report findings to the Director.

d. Technical Functions, Nuclear Assurance, and Radiation and Environmental Controls Directors and their Headquarters-based senior assistants will tour the plants and report their findings.

Conclusion:

While management were doing many of the items indicated above prior to our 19 November 1983 report, these actions have now been formalized and are being checked by the Corporation to assure they are accomplished. The team concluded that GPU Nuclear Corporation is implementing this recommendation.

C. Recommendation:

"Some personnel in the TMI-1 Training Department responsible for training licensed operators are not yet qualified Senior Reactor Operators. We recommend that these personnel complete qualification procedures as soon as possible."

Action:

The training program and formal NRC certification program for Senior Reactor Operators (SRO) has resulted in 18 licensed SRO's in the Operations Division in addition to those in the Training Department. A schedule has been developed for rotation of these licensed operators into the Training Division to ensure that the training is done by completely qualified personnel. At the same time, additional personnel now in the Training Division will be examined for SRO certification to further increase the flexibility in use of qualified instructors.

D. Recommendation:

"GPU Nuclear should continue to reduce its dependence on the use of consultants. The organization should become self-sufficient to the point where use of such personnel would be necessary only in special circumstances where development of in-house capability could not be justified."

Action:

During the 16 and 17 April visit, GPU Nuclear Corporation advised that by 1 June 1984 all normal maintenance and operations would be accomplished by GPU Nuclear employees.

Consultants would be used in 1984 and later only in circumstances such as the following:

1. Use of Babcock & Wilcox for access to original plant design and safety information.
2. Use of architect/engineers to do detail design of plant modifications. This work will be directed and reviewed by GPU Nuclear personnel.
3. Special operations such as metallurgical examinations, nondestructive testing, and acoustical engineering where special equipment and training are required.

GPU Nuclear management stated that in-house capability had developed to the point that consultants were not required except in special circumstances as listed above.

Conclusion:

The team concluded that satisfactory progress was being made in this area.

E. Recommendation:

"The general announcing system for the TMI plant distracts personnel in the control room. The system should be modified to significantly reduce these broadcasts to the control room. This will prevent distraction of operators from their primary duties. Also, too many people are in the control room. Only those essential to the operation of the plant should be there. Instructions to this effect should be posted and complied with."

Action:

The team inspected the control room at a time when a testing evolution was in progress (TMI-1 plant leak-test of the reactor containment vessel) and found conditions markedly improved over those observed in October and November 1983.

The distraction caused by the general announcing system in the control room no longer exists. The announcing system has been modified so that, in normal use, no announcements are heard in the control room. A special circuit (activated by a red button at a restricted number of stations) is used to make announcements in the control room and instructions have been issued to limit these announcements to those essential for the operation of the plant.

Access to the control room has also been sharply curtailed and is controlled personally by the Shift Supervisor or Shift Foreman. The team noted evidence that this rule was being enforced.

The conduct of the test which was underway at the time of our last visit contrasted sharply with the October 1983 visit which was also during a time when a test was underway. That earlier test had been directed from the control room. The large number of people, the constant alarms and ready access to the control room had demonstrated that future tests should be conducted from spaces outside the control room to the maximum degree possible.

At the time of this visit, testing was not conducted from the control room, no personnel outside the regular operations section were present, and the ambiance was one of professionalism in dress (uniforms) and conduct.

Institutional Plan for the Institute of Nuclear Power Operations

MAY 1983

Executive Summary

The nuclear electric utility industry established the Institute of Nuclear Power Operations (INPO) in 1979 to promote improved safety and reliability in the operation of its nuclear plants. After its formation, the Institute grew rapidly from a handful of on-loan personnel in late 1979 to over 300 permanent and on-loan personnel some three years later. The first three years were marked by growth and evolution of the Institute's programs and organization.

The Institute is now entering a new phase—a period of consolidation. Emphasis will be focused on improvements in established programs and refinement of methods and products.

In order for INPO to carry out its role, it must have the support of its members and the cooperation of the NRC. A basis for that support and cooperation is an understanding of INPO's role. This plan is intended to provide that basis by defining INPO's role.

This plan defines the major programs currently in effect or planned. It considers the current and projected needs of the industry and the overall environment in which INPO and its member utilities and participants operate.

In forming INPO, the nuclear utility industry took an unusual step. In committing to meet INPO's criteria and to take corrective action in response to INPO recommendations, the industry clearly established and accepted a form of self-regulation by peer review. Among the many initiatives in recent years in self-regulation, most are sponsored and overseen by the government. The nuclear utility industry, however, placed itself in the role of overseeing INPO activities, while at the same time uniquely endowing INPO with authority to bring pressure for change on individual members. That feature makes INPO unique. Industry's recognition that all nuclear utilities are affected by the action of any one served as a principal motivation for this unusual initiative.

Each individual member utility (licensee) has the responsibility for the safe operation of its nuclear plant(s). The U.S. Nuclear Regulatory Commission (NRC) has statutory responsibility for overseeing the licensees and ensuring that each licensee is in compliance with federal regulations related to its facility(ies) within that framework. Compliance with regulations alone, however, does not necessarily ensure the best possible performance. INPO's role is to promote excellence in the construction and operation of its members' nuclear plants.

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1.

Purpose

The purpose of this Institutional Plan is to define the established and projected programs of INPO and to provide a foundation for carrying out these programs. This plan accomplishes the following:

- updates and supersedes the original organization plan, incorporating actions by the Board of Directors since the original plan was issued in September 1979
- sets forth the mission and philosophy of operations for the Institute
- describes the organization of the Institute
- describes the programs the Institute is expected to carry out, including objectives of each program
- defines INPO's overall role in the industry–its relationship with its members and participants, other industry organizations, and government agencies

2. Background

The Institute of Nuclear Power Operations was established in 1979 as an industry initiative in response to the need revealed by the Three Mile Island accident. An organization plan was developed with the assistance of several industry groups formed for that purpose. The original organization plan was issued by INPO's founders in September 1979. (The founding groups are listed in Appendix C.) U.S. utilities with operating licenses or construction permits for nuclear plants were involved in INPO's development, and all became members soon after the Institute was formed.

The Institute was incorporated as a nonprofit corporation in the State of Delaware on October 12, 1979, and opened its doors for business in Atlanta, Georgia, on December 3, 1979. Over the next three years, INPO developed rapidly as it endeavored to implement the organization plan and carry out the safety and reliability mission established by the founders.

The original plan served as a foundation for INPO's development. The post-TMI period was one of rapid change for the industry, requiring INPO to undertake additional initiatives. Over its first three years, the Institute's role evolved to accommodate changing requirements in the industry and to build on the experience gained. Significant changes have been made to the original organization, and new programs have been added.

This period of development has been guided by INPO's Board of Directors with the advice of its Advisory Council, and by INPO management with the advice and counsel of Industry Review Groups, as intended by the founders. The original organization and programs have been modified to best achieve the Institute's mission. The Institute is now entering a new phase–a period of consolidation. The next few years are expected to be a period of only limited growth. Emphasis will be on improvements in established programs and refinement of methods and products.

3.

Organization

The Institute's organization is similar to a typical U.S. corporation. A board of directors oversees the operations and activities of the Institute. Board members are utility executives or senior managers elected by INPO's member utilities. The president of the Institute is elected by and reports to the Board of Directors. The Institute's technical and support divisions report to the president.

An Advisory Council of professionals from outside the industry reviews Institute activities and provides advice on broad objectives and methods to the Board of Directors. The Advisory Council is composed of distinguished professionals in areas related to the Institute's activities and includes prominent educators, scientists, industrialists, and health specialists.

An Industry Review Group (IRG), made up of professionals from member utilities, is established for each technical division. These IRGs provide advice and feedback to the director of the respective INPO division. The IRGs may also be assigned specific review or audit functions by the Board of Directors.

An Industry Communications Council (ICC), made up of professionals from member utilities, provides advice to the director of the Communications Division, with emphasis on emergency preparedness communications.

Non-U.S. nuclear utility organizations actively participate in INPO. The International Participant Advisory Committee provides advice to the director of INPO's International Division. Membership of the International Participant Advisory Committee consists of one professional from each international participant.

Nuclear steam supply system suppliers and architect-engineering firms involved in nuclear work are eligible for participation in INPO. The Supplier Participant Advisory Committee provides advice on INPO's Supplier Participant Program. Membership of the Supplier Participant Advisory Committee consists of one professional from each supplier participant.

4.

Mission and Philosophy of Operation

The mission of the Institute is to promote the highest levels of safety and reliability in the operation of nuclear electric generating plants.

In carrying out this mission, the Institute strives to

- Encourage excellence in all phases of construction, design control, and operation.
- Provide guidance for its members' use in training and qualifying personnel to operate, maintain, and support their nuclear plants.
- Analyze events that occur in construction, testing, and operation of nuclear plants worldwide to identify possible precursors of more serious events; disseminate the lessons learned.
- Extensively involve personnel from member utilities and participants in its work to promote exchange of information and to ensure its programs meet current needs of its members and participants.
- Use expertise and experience from outside the U.S. nuclear utility industry to provide industry access to best methods and technologies available, including exchange of information with non-U.S. organizations.
- Promote exchange of information and good practices among its members and participants; recognize the importance of improving or refining existing practices, rather than supplanting them.
- Assist member utilities in implementing their own improvements, rather than attempting to preempt their management responsibility.
- Promote improved human resource management in the industry, including activities such as educational assistance, recruiting, screening, selection, and retention of key personnel.

Programs to carry out the Institute's mission and to implement its philosophy of operation are described in Section 5 of this plan.

5.

Programs and Activities

INPO's current and projected programs are described in detail in Appendix A; the following provides an outline of the Institute's major activities:

A. **EVALUATION PROGRAM**
Evaluations are conducted of nuclear plants under construction or operated by member utilities. Reviews of corporate support of construction projects and operating plants are included. Conduct of these evaluations is based on standards of excellence and written criteria.

B. **DEVELOPMENT OF DOCUMENTS—CRITERIA, GUIDELINES, GOOD PRACTICES, ETC.**
Several categories of documents are developed and designed to assist member utilities and participants in their efforts to achieve excellence in training programs and in construction, operation, maintenance, and support of nuclear plants. Key categories of INPO documents are as follows:

1. Criteria documents provide a basis for the evaluation programs. Members are expected to strive to meet the criteria set forth in these documents.

2. Guidelines establish the basis for sound programs in selected areas of plant construction, operation, or training. Member utilities are expected to strive to meet the intent of INPO guidelines.

3. Good Practices are provided to assist member utilities. They can be used as furnished, modified, or not used if an alternate approach is considered as good or better by the member utility.

4. Various other documents are produced by INPO such as evaluation reports and special reports or studies.

C. **TRAINING ACCREDITATION**
INPO assists all members in preparing for and achieving accreditation of training programs for personnel involved in the operation, maintenance, and support of nuclear plants.

D. **ANALYSIS OF EVENTS**
Events that occur in the construction, testing, and operation of nuclear plants are analyzed by INPO. Lessons learned are disseminated to members and participants on a timely basis, and on-site reviews of corrective actions are conducted at the plants of member utilities as part of the evaluation program. The program is designed to correct the causes of recurring events and to identify precursors of more serious potential events.

E. ASSISTANCE TO MEMBERS

Assistance to member utilities in their efforts to achieve excellence takes several forms:

1. As construction projects near completion, an evaluation team makes an assistance visit to each project when it is in the Near-Term Operating License (NTOL) phase. The purpose of this visit is to assist the member in preparing to operate the new plant safely and reliably.

2. INPO personnel observe and comment on emergency preparedness drills and exercises as an ongoing form of assistance.

3. Various workshops and seminars are conducted to assist members in exchanging information.

4. The sharing of information or good practices and the Good Practice documents described previously are a form of assistance to members.

5. Special visits to member utilities by INPO personnel in response to requests by the utilities are one of the most important areas of assistance. They are independent of INPO's evaluation program (though a request for such visits frequently stems from an evaluation) and are intended solely to assist members in improving their operations.

F. INFORMATION EXCHANGE/DATA BASE RESOURCES/ NUCLEAR PLANT RELIABILITY DATA SYSTEM (NPRDS)

INPO manages NUCLEAR NOTEPAD, a worldwide computerized teleconferencing network. The NOTEPAD system is used by INPO and its members and participants for the exchange of information on construction, operation, maintenance, and support of nuclear plants. Additionally, INPO operates a computer complex to provide members and participants access to data in areas such as training, job and task analysis, operating experience, and equipment reliability. One such data base on the INPO computer is the NPRDS, which provides reliability data on systems and components important to nuclear plant safety.

G. INTERNATIONAL PROGRAM

Utility organizations in other countries are eligible to become participants in INPO. This program is intended to facilitate exchange of information and experience, thereby promoting safe and reliable nuclear plant operation worldwide. International participants receive all INPO products that are provided to domestic members and are invited to INPO workshops. Assistance visits and technical exchange meetings are conducted both in the U.S. and abroad as schedules and resources permit. International participants are afforded access to INPO's experience and can adopt INPO methods, as desired, in areas such as plant evaluations and training program accreditation.

H. SUPPLIER PARTICIPANT PROGRAM

Nuclear steam supply system suppliers and architect-engineering firms involved in nuclear work are eligible to participate in INPO. This program is intended to promote exchange of technical information and to translate user experience to the designer and manufacturer.

I. LOANED EMPLOYEE PROGRAM

INPO relies heavily on loaned employees from members and participants. This program is designed to provide a continuing source of personnel with recent utility experience to augment the INPO staff. It also allows the loaned personnel an opportunity to gain broad experience in the industry. Approximately one-fourth of INPO's technical staff is loaned personnel.

J. INPO STAFF SUPPORT TO SPECIAL INDUSTRY COMMITTEES

INPO is authorized to provide support to Nuclear Utility Task Action Committees (NUTACs), established to work on selected generic safety and regulatory issues. The prerequisites for INPO support of a NUTAC and operating guidance for NUTACs are contained in the charter for NUTACs approved by INPO's Board of Directors.

6.

INPO's Role–Relationships with Members, Participants, and Other Organizations

In carrying out its dual role of evaluation and assistance, INPO depends on the support of its members and participants and the cooperation of federal agencies, particularly the Nuclear Regulatory Commission (NRC).

In order for INPO to have credibility with both its members and with the government, INPO must maintain its independence with respect to any individual member and with respect to government agencies. At the same time, INPO must be responsive to the collective needs of the nuclear utilities and to requests for assistance by individual members. INPO also must coordinate its activities with other industry and government organizations.

The following set forth certain principles and assumptions that provide for coordination and support of INPO activities:

- Member utilities are expected to strive to meet INPO criteria. INPO ensures the appropriate Industry Review Group (IRG) is provided an opportunity to review and comment on all criteria.
- Member utilities are expected to be responsive to INPO recommendations made in conjunction with its evaluation, accreditation, and events analysis programs.
- Member utilities are expected to achieve and maintain accreditation of their training programs for personnel who operate, maintain, and support their nuclear plants.
- INPO is expected by its members to follow up on evaluation report recommendations and Significant Operating Experience Report recommendations to see that corrective actions have been implemented industrywide.
- In the event INPO is unable to resolve a significant safety issue with a member utility, a special procedure approved by INPO's Board of Directors and furnished to member utilities is followed. This procedure provides for interactions between INPO's Board of Directors and the chief executive officer (CEO) of the affected utility, the board of directors of the affected utility, and, if necessary, ultimately with the insurers of the affected utility.
- INPO criteria and recommendations are written without regard to constraints or agreements an individual member may have. Since the criteria and recommendations involve reactor safety and public health and safety, each member utility is expected to resolve any impediments to their implementation that may be imposed by outside organizations, such as bargaining units.

- INPO members who are also members of Nuclear Electric Insurance Limited (NEIL) provide NEIL copies of INPO evaluation reports as a condition of coverage. INPO encourages its members to provide copies of the final reports to the NRC.
- INPO members and participants limit their requests for assistance from INPO to areas or activities that are within in the scope of this plan.
- INPO should not become involved in or conduct assistance visits concerning situations when a member is confronted with a specific regulatory issue. This could result in INPO involvement in legal proceedings and could impact its independent status.
- INPO should not become involved in public or media activities on behalf of the industry or in the role of promoting the nuclear power option. Such involvement could undermine INPO's credibility.

To coordinate its activities to best serve its members and participants, INPO maintains liaison with industry organizations such as Atomic Industrial Forum (AIF), American Nuclear Energy Council (ANEC), American Nuclear Society (ANS), American Public Power Association (APPA), The U.S. Committee for Energy Awareness (USCEA), Edison Electric Institute (EEI), Electric Power Research Institute (EPRI), and National Rural Electric Cooperative Association (NRECA).

To minimize duplication of efforts and to support its members, INPO maintains liaison with insurer groups such as American Nuclear Insurers, Nuclear Mutual Limited, Nuclear Electric Insurance Limited, and Mutual Atomic Energy Reinsurance Pool.

Coordination of INPO activities with the Nuclear Regulatory Commission is described in Appendix B. INPO coordinates its activities with other agencies of the Federal Government as appropriate. For example, certain aspects of the International Program are coordinated with the Department of State. INPO has a formal Participation Agreement with the Department of Energy (DOE), and DOE has funded support for some of INPO's programs.

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Appendix A

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1. Evaluation Programs

1.1 OPERATING PLANT EVALUATIONS

INPO conducts periodic evaluations of operating nuclear plants to promote the highest levels of excellence in the operation, maintenance, and support of these plants. Teams of qualified and experienced INPO personnel conduct these evaluations to assess the knowledge and performance of station personnel; the condition of systems and equipment; the quality of programs and procedures; and the effectiveness of station management, with focus on plant safety and reliability. The following areas are covered: organization and administration, operations, maintenance, technical support, training, radiological protection, chemistry, and emergency preparedness. Observations of station personnel performance during simulator training sessions may be included. Evaluations are performance-oriented and are based on performance objectives and criteria developed by INPO with industry review. Evaluations of each operating nuclear station are conducted at an average interval of about 15 months.

Formal reports of findings and recommendations for improvement are provided to the utility. Utility responses to INPO recommendations, with commitments to improved performance, are included in the final report. INPO follows up to assess achievement of the recommended improvements.

Member utilities are urged to release the final reports for distribution according to a release policy approved by INPO's Board of Directors. Member utilities also are urged to provide copies of the final report to the Nuclear Regulatory Commission (NRC).

1.2 CONSTRUCTION PROJECT EVALUATIONS

INPO evaluates construction projects to promote the highest quality in design control and construction activities, including selected start-up and testing activities. The projects involved include all those not in the near-term operating license (NTOL) phase. Evaluations of construction projects will be conducted approximately every 18 months until the projects enter the NTOL phase.

These evaluations are conducted by INPO evaluation teams, which may be supplemented by utility-appointed personnel, or by third party evaluation teams contracted by the utility and monitored by INPO. In either case, evaluations are based on INPO-developed performance objectives and criteria and use INPO methodology for performance-oriented evaluations. The evaluations encompass project-related activities at the construction site, utility corporate headquarters, and location(s) of major design activities, such as the architect-engineer and nuclear steam supply system (NSSS) design offices.

The majority of INPO's construction project evaluation staff consists of personnel on loan from member utilities and supplier participants.

Member utilities are urged to release the final reports for distribution according to a release policy approved by INPO's Board of Directors. Member utilities also are urged to provide copies of the final report to the NRC.

1.3 CORPORATE EVALUATIONS AND ASSISTANCE VISITS

INPO conducts evaluations of utility corporate organizations to promote improvements in corporate support of operating nuclear stations. Teams of experienced personnel conduct these evaluations to assess quality of programs and procedures and effectiveness of corporate management, focusing on issues relating to nuclear station safety and reliability. The following areas are covered: organization and administration, conduct of operations, maintenance support, technical support, materials management, training and qualification, personnel, radiological protection, chemistry, assurance programs, industrial safety, licensing and regulatory requirements, and emergency preparedness. Evaluations are as performance-oriented as practicable and are based on performance objectives and criteria developed by INPO, with industry review.

Corporate evaluations normally are scheduled in conjunction with and complementary to an evaluation of a utility's nuclear station. As resources permit, INPO will conduct corporate evaluations of each member utility with an operating station(s) at an average interval of 15 months.

Insofar as practical, the findings and/or recommendations identified during the corporate phase of the evaluation are included in the evaluation report for the operating station. INPO recognizes that some findings or recommendations related to corporate support should not be included in the station report. Findings and/or recommendations of this nature are provided separately. The utility is expected, however, to respond to these findings and/or recommendations, and INPO will follow up on them in succeeding corporate and station evaluations.

2. Accreditation and Training Programs

2.1 ACCREDITATION PROGRAM

INPO manages the accreditation of training programs conducted for utility operations, maintenance, and technical support personnel. This program is designed to identify weaknesses in utility training systems and to assist in making improvements. The process includes self-evaluations by member utilities, with assistance by INPO staff; on-site evaluations by a team of INPO and utility personnel; and awarding (or deferral) of accreditation by the Accrediting Board. Member utilities are expected to seek accreditation for all training programs covered by the INPO accreditation program. These include the following programs:

- non-licensed operator training
- licensed operator training (including shift supervisor)
- licensed operator requalification training
- shift technical advisor training
- instrument and control technician training
- electrical maintenance personnel training
- mechanical maintenance personnel training
- chemistry technician training
- radiological protection technician training
- manager and technical staff training

Members may apply for accreditation in phases during the first round (until all programs are accredited for the first time.) All members are expected to apply for accreditation of all programs by mid-1986.

During the first round, the process and procedures will be refined. After the first round is completed, all programs at a site will be examined for accreditation renewal at the same time. Each member utility will be expected to apply for accreditation renewal once every four years.

2.2 PERFORMANCE-BASED TRAINING SYSTEM DEVELOPMENT

INPO provides assistance to members in establishing and maintaining performance-based training and qualification systems to help ensure that personnel have the knowledge and skills important to their jobs. INPO provides guidance on the training system development (TSD) process and undertakes projects to assist utilities in implementing such systems.

INPO coordinates industrywide job and task analysis efforts and makes the resulting data available to all members and participants. INPO also assists members in conducting plant-specific job and task analyses and includes plant-specific data in the central data base for use by all utilities.

In evaluating and accrediting industry training, INPO reviews each member utility's progress toward implementing performance-based training.

2.3 TRAINING AND QUALIFICATION GUIDELINES

INPO develops and distributes training and qualification guidelines for operations, maintenance, and support personnel. These guidelines are designed to assist utility trainers in developing quality training programs.

Training and qualification guidelines are revised and updated periodically to incorporate changes identified through job and task analyses and to take into account lessons learned in other INPO programs, such as evaluations, accreditation, events analysis, and workshops.

These training and qualification guidelines collectively should provide a sound basis for each member utility's training program.

2.4 STANDARDIZED GENERAL EMPLOYEE TRAINING PROGRAM IN RADIOLOGICAL PROTECTION

INPO sponsors a standardized general employee training program in generic radiological protection (GET-RP). In this program, members certify that their training meets the intent of INPO general employee training (GET) guidelines. INPO provides standard generic radiological protection examinations and assists members by reviewing GET programs on site and providing recommendations for improvement.

Through this program, member utilities may eliminate redundant radiological protection training by recognizing training provided by other organizations.

3. Events Analysis and Information Exchange Programs

3.1 EVENTS ANALYSIS PROGRAM

INPO reviews and analyzes operating and construction experience (events) from both domestic and non-U.S. nuclear plants. The program is designed to provide in-depth analysis of nuclear operating experience and to apply the lessons learned within the industry. Events are screened for significance, and those with generic applicability are disseminated to the industry in one or more of the following forms:

- Significant Operating Experience Reports (SOERs)
- Significant Event Reports (SERs)
- Operations and Maintenance Reminders (O&MRs)
- INPO special reports
- Workshop and seminar presentations

INPO also conducts detailed field investigations of selected significant events to determine root causes and develop generic recommendations to help prevent recurrence.

Member utilities are expected to support the events analysis program by providing INPO with detailed and timely operating experience information. INPO member utilities are expected to evaluate and take appropriate action on recommendations provided in SOERs and SERs. During its periodic evaluations, INPO follows up on each utility's action in response to these recommendations.

3.2 NUCLEAR PLANT RELIABILITY DATA SYSTEM

INPO manages the Nuclear Plant Reliability Data System (NPRDS). NPRDS supplies reliability data and equipment history on nuclear plant systems and components important to plant safety and reliability. INPO member utilities are expected to report design characteristics and performance data on the systems and components covered by NPRDS to a computerized data base maintained by the Institute. INPO is expected to assist member utilities in using the data to solve plant problems and improve plant safety and reliability.

3.3 NUCLEAR NOTEPAD SYSTEM

NUCLEAR NOTEPAD is an international telecommunications system for the exchange of nuclear plant information. It is the major communication link for the Significant Event Evaluation and Information Network (SEE-IN). Significant events, Significant Event Reports (SERs), and operations and maintenance information are transmitted by the system. It also provides the vehicle for "roundtable" questions and other correspondence among INPO members and participants.

INPO management of NUCLEAR NOTEPAD includes such areas as user relations and training and system administration and planning. INPO staff reviews responses to selected inquiries and enters consolidated replies to significant questions on NUCLEAR NOTEPAD.

The system includes a "passive broadcast" feature for reporting plant emergency situations. This feature allows the affected utility to simultaneously provide U.S. industry and INPO's international participants with timely information. All NOTEPAD users also will receive updates simultaneously. At the same time, all routine channels of NUCLEAR NOTEPAD can continue to function normally.

3.4 PERFORMANCE DATA COLLECTION AND TRENDING

INPO collects and analyzes data and information related to nuclear station performance. To minimize the burden on members, INPO makes maximum use of reports submitted by utilities to the NRC and others. Additional data is collected during evaluations, and from time to time, special requests may be made of member utilities for related data.

The data collected are trended and analyzed at INPO and used in various INPO programs. Industrywide and plant groupings of trended data are made available to member utilities for their use in assessing and improving performance of their nuclear stations.

3.5 LICENSEE EVENT REPORT AND NRC DATA BASES

INPO maintains a complete Licensee Event Report (LER) data base on its computers, with supplementary information on microfilm. This data base is designed primarily to support INPO SEE-IN program activities and related efforts by members and participants. LERs are received by INPO directly from the utilities and entered into the data base. The data base is used for initial LER screening, as well as for trending of plant events.

INPO also maintains an index of the public portion of the NRC document data base on its computers, with the actual records available at the Institute on microfiche. Updated index computer tapes and microfiche are received monthly from the NRC.

The data base allows searches on any topic and locates reports, letters, or memoranda from, to, or within the NRC on the selected subject. Searches also can be performed on dates, authors, company, document types, etc.

INPO members and participants will be provided dial-in access to this data base index. INPO presently conducts searches of this data base for its members and participants on request.

4. Assistance Programs

4.1 SPECIAL ASSISTANCE VISITS

INPO conducts special assistance visits to member utilities and international participants as requested and agreed to by the Institute. These visits provide assistance in specific areas identified by the requesting organization and are in areas in which INPO has experience or expertise. Special assistance visits are conducted by qualified INPO personnel, including permanent staff and on-loan personnel. From time to time, INPO coordinates special assistance visits involving personnel from other utilities or participants.

Written reports of special assistance visit results are provided to the requesting organization. These reports are confidential between INPO and the requesting organization.

These visits are one of the most important means by which INPO provides assistance to its members and participants and are one of the best methods of exchanging information on good practices within the industry. Both the organization visited and the INPO staff benefit from the candid exchange of information during these visits.

4.2 NEAR-TERM OPERATING LICENSE PLANT ASSISTANCE VISITS

INPO conducts assistance visits to near-term operating license (NTOL) plants to help in preparation for operation and to promote the highest standards of excellence. Through these visits, INPO attempts to provide the NTOL plant staff with the full benefit of INPO's experience in evaluating operating plants. Teams of qualified and experienced INPO personnel conduct the assistance visits. The team assesses the plant's readiness for operation, as reflected in the knowledge and performance of station personnel; the condition of systems and equipment; the quality and completeness of programs and procedures; and the effectiveness of station management, with focus on plant safety and reliability. The following areas are covered: organization and administration, operations, maintenance, technical support, training, radiological protection, chemistry, and emergency preparedness. Observations of station personnel performance during simulator training sessions may be included. INPO assistance visits are performance-oriented and are based on performance objectives and criteria developed by INPO, with industry review.

INPO provides recommendations for improvement to utility management in an informal letter report. While a response to the recommendations is not requested, INPO does follow up on its recommendations during the first regular operating plant evaluation after the NTOL visit.

NTOL assistance visits are scheduled at an appropriate time in the NTOL phase (typically six to twelve months prior to fuel load). Follow-on assistance visits may be scheduled for an NTOL plant under special circumstances, such as a delay in fuel load.

4.3 GOOD PRACTICES DEVELOPMENT

INPO develops Good Practice documents covering selected areas of plant construction, operation, maintenance, and support, based on proven methods or best practices found in the industry. Typically, elements of a Good Practice are collected at several utilities and are synthesized into a Good Practice document by the INPO staff, with industry review.

In general, Good Practice documents define one method of meeting INPO performance objectives and criteria. Their use by member utilities is optional, in recognition of the fact that other approaches also can be effective in achieving good performance.

4.4 EMERGENCY PREPAREDNESS PROGRAM

INPO promotes a high degree of readiness throughout the industry to minimize the consequences of a nuclear emergency. INPO provides assistance to member utilities in developing and maintaining effective utility emergency response programs. Additionally, the Institute will assist in organizing and coordinating emergency response support.

Member emergency preparedness programs, including emergency public information, are reviewed. INPO promotes excellence in emergency preparedness through several programs, including evaluations, assistance visits, observation of drills and exercises, and good practices.

4.5 RADIOLOGICAL PROTECTION PROGRAM

INPO assists members in controlling the spread or release of radioactivity associated with nuclear power plant operations and in minimizing individual and collective occupational radiation exposure.

Member radiological protection programs are reviewed. INPO promotes excellence in radiological protection through several programs, including evaluations, assistance visits, training accreditation, and development of criteria and other documents.

4.6 HUMAN RESOURCE MANAGEMENT

INPO undertakes projects designed to assist member utilities in their manpower planning and other human resource management activities. INPO monitors status and trends in utility nuclear-related employment, shortages, manpower losses, and projected growth by conducting surveys of all member utilities. These surveys provide data to assist in focusing industrywide efforts to meet manpower needs and to allow utilities to compare their manpower situations to other utilities and to the industry as a whole.

INPO develops recommendations for personnel selection, plant staffing, and human resource management functions that reflect good practices found in the industry.

INPO manages an industry educational assistance program to encourage selected college students to pursue careers in the nuclear utility industry.

4.7 NUCLEAR UTILITY TASK ACTION COMMITTEES

INPO provides staff support to industry-sponsored Nuclear Utility Task Action Committees (NUTACs). The objective of a NUTAC is to develop industry consensus on a specific generic safety and regulatory issue. INPO support includes committee administration, clerical services, preparation of technical draft documents for committee review, and publishing of NUTAC documents. INPO provides assistance as requested to ensure appropriate interfacing with owners groups, Atomic Industrial Forum (AIF), American Nuclear Society (ANS), Edison Electric Institute (EEI), Electric Power Research Institute (EPRI) and other industry organizations.

Each NUTAC is sponsored by and receives oversight from an INPO Industry Review Group (IRG). NUTACs are required to function in accordance with a general NUTAC charter approved by the INPO Board of Directors. This general charter includes requirements for formation, function, support, and termination. Each NUTAC is required by the general charter to establish a specific charter that describes the purpose, objectives, and commitments to the sponsoring IRG. A specific NUTAC charter requires concurrence of the sponsoring IRG chairman and the INPO president.

4.8 WORKSHOPS

INPO sponsors workshops for various levels of utility management and in specific technical areas to provide forums for information exchange between INPO and its members and participants. This information exchange provides an opportunity to share industry lessons learned through various INPO programs and obtain industry feedback on INPO programs and activities. INPO-sponsored workshops also allow individuals from member utilities to meet and exchange information with their counterparts at other utilities.

Appendix B

INPO Relationship with NRC

The nuclear utility industry in the United States, like other industries that impact the health and safety of the general public, is regulated by the federal government. This regulation is statutory and, in the case of the nuclear industry, is based on the Atomic Energy Act of 1954 as amended, and is carried out by the Nuclear Regulatory Commission (NRC). How the NRC carries out its responsibilities to regulate the nuclear industry has undergone substantial change since the Three Mile Island (TMI) accident. This change, which is still evolving, has tended to broaden NRC's role.

INPO was created not to supplant the regulatory role of the NRC, but to provide the means whereby the industry itself could, acting collectively, make its nuclear operations safer. It was envisioned that peer reviews and criteria based on excellence could be effective in bringing about improvements. In the broad sense, the ultimate goals of the NRC and INPO are the same in that both strive to protect the public. How these goals are achieved is necessarily different. It was recognized that in establishing and meeting its goals and objectives, INPO would have to work closely with the NRC, while at the same time not becoming or appearing to become either an extension of the NRC, or an advocacy agent of the utilities.

The conduct of evaluations is one of the most important functions performed by INPO. It is also a function that puts INPO close to the role of being a regulator. The NRC issues regulations and is required to determine if they are being carried out. INPO issues criteria and conducts evaluations to see how well the criteria are being met. While these two may appear very similar, there are significant differences. There is the basic difference between NRC regulations and INPO criteria. An NRC regulation is a condition or specification that must be met in order to obtain or retain a license. INPO criteria generally establish goals that provide broad statements of conditions. Regulations normally should not be subjective, whereas INPO criteria usually are.

Another difference relates to the purpose of the evaluation in contrast to a regulatory audit. The former stresses assistance in achieving a given goal, whereas the latter stresses compliance to a requirement. Both are considered necessary.

It is because of these differences that INPO and its members conclude there should be a clear separation between INPO evaluations and NRC audits. It is intended that the NRC will take cognizance of INPO evaluations. It is anticipated that NRC will make its determination of credit due the industry through reviewing the INPO process and program and not through monitoring INPO's interactions with its individual members.

This appendix sets forth the principles necessary for INPO to support the industry within the existing regulatory framework.

In concept, the industry expects INPO to keep the NRC apprised of its generic activities, while INPO's interactions with an individual member are between that member and INPO (except where reportable occurrences are encountered, as discussed below).

INPO recognizes the need for NRC to assess the quality of its products and the success of its programs. INPO expects to meet its obligations in this regard and to obtain recognition for industry's self-regulation efforts in the following ways:

- provide NRC with copies of generic documents
- brief NRC on its programs and activities
- obtain agreement from member utilities for NRC representatives to observe certain INPO field activities
- encourage member utilities to provide copies of evaluation reports to the NRC

On the other hand, the industry expects NRC to recognize that audits or inspections of INPO activities or records are the responsibility of the president of INPO or INPO's Board of Directors. Reviews or audits of INPO's technical activities normally are carried out by the Industry Review Groups. In view of this, while the industry expects and welcomes INPO exchange of information with NRC and NRC review of INPO products and programs, the industry expects NRC to refrain from formal audits or inspections of INPO by the NRC staff or a contracted third party. In support of these efforts, NRC and INPO have entered into a Memorandum of Agreement that includes coordination plans covering areas of mutual interest.

The following specific principles and assumptions supplement those listed in Section 6 of the Institutional Plan:

- INPO criteria and recommendations are based on best practices and industry's commitment to excellence, not on regulatory requirements. As a consequence, utilities should not have to answer to NRC concerning INPO findings and recommendations except as noted below.
- INPO has a statutory obligation to report violations of the Code of Federal Regulations and to ensure that reportable events of which it becomes knowledgeable are reported. Normally, INPO will request that its members make any such reports. An internal INPO procedure covers this area in detail.
- INPO conducts certain private transactions with its members. For example, when a member recognizes it is experiencing difficulty in an area where INPO has expertise, INPO encourages that member to request a special assistance visit. NRC participation in or requests for copies of correspondence concerning such visits could be a deterrent to requests for these visits. Similarly, the exit meetings following INPO evaluations are more productive if there is open exchange of information between the INPO team and the utility. NRC presence in these meetings may be a deterrent to constructive dialog.
- The industry expects that NRC will not utilize the routine proceedings between INPO and its members as a basis for actions against INPO's members. Both INPO and its members feel it would be counterproductive for the NRC to use information derived from routine INPO proceedings with its members to determine the level or degree of punitive actions it might levy against a member.

Appendix C

INPO Founding Groups

The following committees and advisory groups were involved in the original development of the Institute of Nuclear Power Operations.

TMI Ad Hoc Nuclear Oversight Committee

(Senior industry committee)

Floyd L. Lewis, Chairman
Middle South Utilities, Inc.

Thomas G. Ayers
Commonwealth Edison Co.

James L. Everett
Philadelphia Electric Co.

William S. Lee
Duke Power Co.

Frank Linder
Dairyland Power Cooperative

A.J. Pfister
Salt River Project

John D. Selby
Consumers Power Co.

Frank M. Warren
Portland General Electric Co.

INPO Steering Committee

(Overseeing establishment of INPO; reported to Oversight Committee)

William S. Lee, Chairman
Duke Power Co.

A.J. Pfister, Vice Chairman
Salt River Project

Howard P. Braun
Pacific Gas and Electric Co.

Sol Burnstein
Wisconsin Electric Power Co.

Richard M. Eckert
Public Service Electric and Gas Co.

Byron Lee, Jr.
Commonwealth Edison Co.

Frank M. Staszesky
Boston Edison Co.

James Taylor
Dairyland Power Cooperative

INPO Establishment Advisory Group

To advise on the functions and organization of INPO, Dr. Chauncey Starr assembled a group of experienced people from various activities with strong national safety programs or who had participated in major educational activities related to safety.

Dr. S.A. Bernsen and
Frank M. Staszesky, Jr.
Bechtel Power Corp.

Dr. Joseph J. Bulmer
President, Hudson Valley Community College (formerly in charge of the Naval Nuclear Power Engineering School at the Knolls Atomic Power Laboratory)

Leo Duffey
EG&G Idaho, Inc. (formerly with Bettis Atomic Power Laboratory)

Jerome Lederer
Retired (formerly Director of Safety, NASA, and Director, Flight Safety Foundation)

Dr. Miles Leverett
Retired (formerly with General Electric Co.)

Dr. Russell O'Neill
Dean, School of Engineering and Applied Science, University of California at Los Angeles

Walker Rapp
Pacific Gas and Electric Co.

Fred P. Riley
Southern California Edison Co.

AIF Policy Committee on Follow-up to TMI Accident

(Recommended establishment of INPO; reported to Oversight Committee)

Byron Lee, Jr., Chairman
Commonwealth Edison Co.

Robert A. Szalay, Secretary
Atomic Industrial Forum

Shepard Bartnoff
Jersey Central Power & Light Co.

Vincent S. Boyer
Philadelphia Electric Co.

A. Phillip Bray
General Electric Co.

Robert Cockrell
Washington Public Power Supply System

Joseph R. Dietrich
Combustion Engineering, Inc.

Roy H. Dunham
Tennessee Valley Authority

Richard M. Eckert
Public Service Electric and Gas Co.

Walt F. Fee
Northeast Utilities

D. Clark Gibbs
Middle South Services, Inc.

John W. Gore, Jr.
Baltimore Gas and Electric Co.

Steve H. Howell
Consumers Power Co.

William J.L. Kennedy
Stone & Webster Engineering Corp.

Leonard J. Koch
Illinois Power Co.

William J. Lindblad
Portland General Electric Co.

John H. MacMillan
Babcock & Wilcox Co.

Warren H. Owen
Duke Power Co.

Romano Salvatori
Westinghouse Electric Corp.

Charles W. Sanford
Bechtel Power Corp.

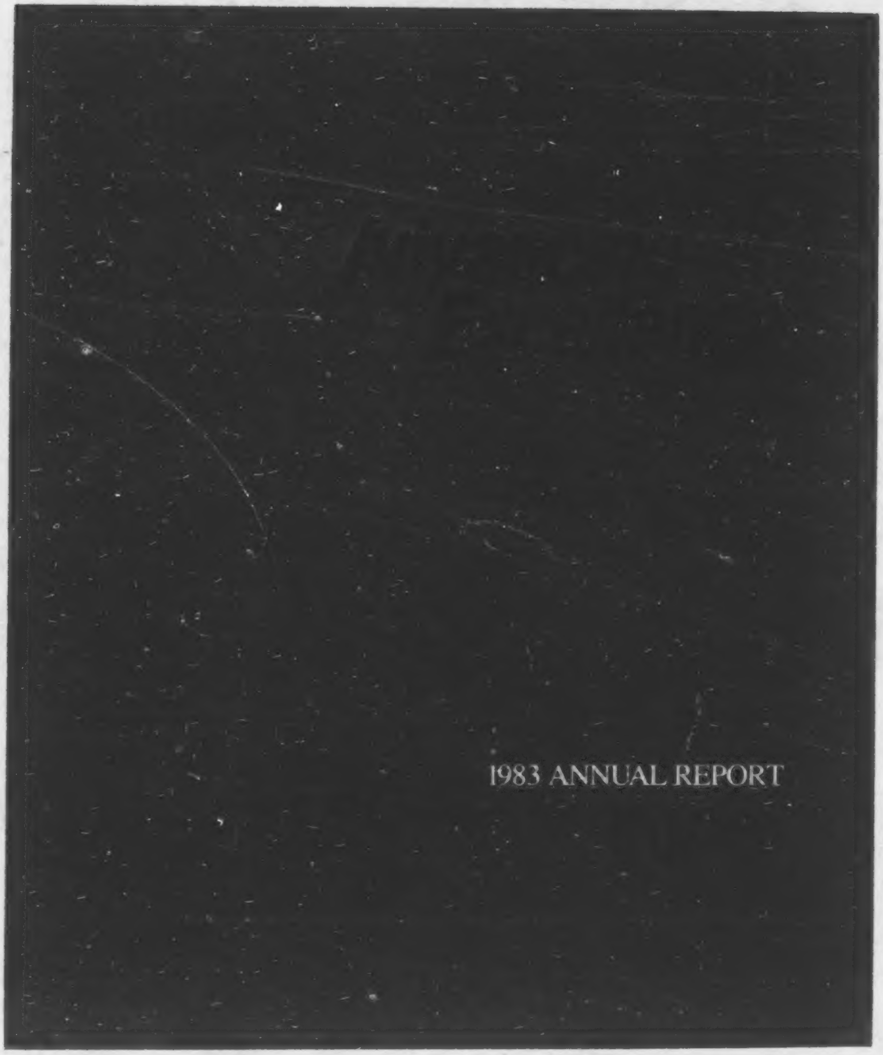
James R. Stoudt
Gilbert/Commonwealth Companies

Ruble A. Thomas
Southern Company Services, Inc.

Donald E. Vandenburgh
Yankee Atomic Electric Co.

William Wallace, III
Ebasco Services, Inc.

John Ward
Sargent & Lundy, Inc.



1983 ANNUAL REPORT

Message from the Chairman

L.F. Sillin Jr.
Chairman of the Board

Hard work and dedication produce results, and results are what INPO's 1983 Annual Report is about. Appropriately, the theme of this year's report is "Advancing Excellence." In the following pages, I believe the progress that has been accomplished by INPO and the nuclear utility industry during 1983 is evident.

The last four years have been dramatic ones for the industry. We have had to make changes both in our thinking and in the way we manage, operate and build our plants. Many times, these changes have resulted from an INPO recommendation.

This year, 1983, produced strong evidence that INPO has matured and grown and is demonstrating its value to its members. But most gratifying is how responsive the utilities have been.

In May 1983, INPO distributed to its members and participants the *Institutional Plan for the Institute of Nuclear Power Operations*. This document is important because it defines INPO's major programs and considers the current and projected needs of the industry. It also addresses the overall environment in which the Institute and its members and participants operate.

Outlined in this plan are the responsibilities of INPO and its members. The bottom line is that it is INPO's obligation to make recommendations for improvements and to assist its members in making these improvements. Industry's obligation is to take INPO's recommendations and make certain they are implemented.

INPO and its members are taking these responsibilities seriously. No more clearly was this expressed than at the 1983 CEO workshop, "Management Involvement." More than 130 senior nuclear executives met for a two-day, hard-hitting session, and the unmistakable message was this: Yes, we have seen numerous improvements, but there is more to do. While our rate of progress has been impressive, we recognize that it must be maintained and achieved more uniformly.

It was stressed time and again at the workshop that management involvement at all levels is the key element in successful nuclear operations. And involvement means just that—to be seen, heard and understood by the engineers, operators, technicians and other professionals who run the plants. It also means encouraging all involved to perform as a team of professionals dedicated to achieving INPO's standards of excellence.

When this year's workshop closed, I felt more positive than ever regarding the industry's dedication to nuclear safety. There was an obvious esprit de corps among the industry leaders that pointed out we are united in our commitment. And INPO is there to help all of its members meet that commitment.

When INPO was first established, it had a monumental task ahead. It had to establish ways to help a badly shaken industry pick itself up, continue to work and realistically face what had to be done for improvement. At the same time, INPO had to assume the correct posture, realizing that if it did not, the Institute could be perceived as an intruder, an auditor working against the industry that created it.

To earn the industry's confidence and gain public and regulatory credibility, the right person had to be chosen to serve as INPO's president. Dennis Wilkinson was selected, and it was a wise choice made by the founders of INPO.

As INPO's chairman, it was my responsibility at the 1983 CEO workshop to announce Dennis' decision to retire in March 1984. This was not easy, for he has been a guiding force in INPO's organization and development. His leadership, dedication and commitment to the success of the concept of self-improvement and self-regulation led to the programs that are now producing results. Many of the improvements we are seeing in overall plant operations and construction stem, in great part, from the wisdom and perception of his leadership.

Dennis' departure will leave a void, but I know that INPO's new president, Zack Pate, will continue the fine work that Dennis began. Also, INPO's members are now familiar with INPO's programs and activities, and there is a consensus on what must be done for continued improvement.

Returning to the theme of this year's annual report, "Advancing Excellence," I believe there is little doubt that INPO and the industry are progressing together. I am confident that we in the industry and at INPO realize that advancing excellence is a continuous process and that high standards cannot be compromised. The industry will not settle for less than best efforts.

Lee Sillin

E.P. Wilkinson
President and Chief Executive Officer

Message from the President

INPO began work when it was little more than an idea in the minds of its founders. There were no offices, no telephones, no copying machines—only a handful of people.

Gradually, we built. INPO developed organizational form and structure, acquired facilities and talent, and began work on fundamental problems. Now four years later, as Mr. Sillin reported, we can speak of results.

This year's annual report follows the four broad areas highlighted in the Institutional Plan: evaluation programs, accreditation and training programs, events analysis and information exchange programs, and assistance programs.

Although the following pages carry a more in-depth look at INPO's progress in 1983, I want to emphasize a few of the more significant milestones during the year.

In January, phase two of the Construction Project Evaluation Program was approved by our Board of Directors. These evaluations are underway, and the utilities are taking actions to upgrade their control of design and construction activities.

In the spring, INPO began the third round of operating plant evaluations. We can see definite improvement at the utilities and plants since the evaluation process was initiated. INPO is becoming more effective in identifying opportunities for improvement, and the members are responding by implementing improvements.

This year, both international and supplier advisory groups were formed. These actions reflect the increasingly important role that the International and Supplier Participant programs are playing in INPO's overall efforts to enhance nuclear operations. A worldwide sharing of ideas and experiences is one of INPO's primary goals and is emphasized by the International and Supplier Division.

The accreditation of nuclear utility training programs was another major effort in 1983. The Accrediting Board, made up of representatives outside the Institute, was selected, and the first utility's training programs earned accreditation in August. In the future, all INPO member utilities are expected to achieve accreditation and recertify it every four years.

On July 1, the data base for the Nuclear Plant Reliability Data System, NPRDS, was brought in-house. Since that time, the percentage of utilities entering data into the system has increased significantly. This increase in participation was facilitated by the new interactive data entry, which also was made available to members July 1.

In 1983, the Events Analysis Program was expanded to include routine reviews of NPRDS failure reports. Additionally, a significantly increased flow of off-normal event information from construction projects and international participants was received. Since its inception in early 1980, the SEE-IN (Significant Event Evaluation and Information Network) program has issued nearly 300 recommendations. The cumulative benefit to the safety and reliability of nuclear plant operation—which is accruing as the recommendations are implemented by the utilities—is a powerful and pervasive underlying force for improvement.

INPO's members are demonstrating their involvement in other areas. Taking advantage of INPO's collective expertise from plant evaluations and other experience, our members requested more special assistance visits in 1983 than ever before. The result was improvement in a wide range of specific areas.

The NRC has demonstrated a cooperative spirit in many INPO efforts. Such areas include the Institute's Events Analysis Program, radiological protection programs, plant evaluations, and INPO and industry training efforts. Both INPO and the industry appreciate the NRC's support during this period of development.

On February 1, 1984, I complete my fourth year as president of the Institute. At the CEO workshop in September, it was announced that I would be retiring in March 1984.

This is my last opportunity to address INPO's members and participants in the annual report. I want to say that in establishing INPO, the industry created the concept of self-improvement and self-regulation. This was a bold and major commitment. I applaud the industry for such an initiative.

Making electricity is not just important work, it is vital. It is imperative that it be produced safely and reliably. While there is more work to do, there can be little doubt that the nuclear utility industry has made substantial progress since Three Mile Island.

At the CEO workshop, it also was announced by our Board of Directors that Dr. Zack Pate would be the next president of INPO. I am very pleased at that selection, and I have great confidence in INPO's future and performance under his direction and leadership.

I wish to express my appreciation to those who have supported INPO so well during my tenure. To the Board of Directors, the Advisory Council, the various other advisory groups—such as the Industry Review Groups—to our members and participants and, of course, to the Institute's dedicated employees, I thank you for your support.

E P Wilkinson

Plants with GET-RP Certification

Statistical Highlights

All numbers listed are total 1983 figures only

Operating Plant Evaluations	31
Construction Project Evaluations	7
Corporate Evaluation and Assistance Visits	13
Accreditation Team Site Visits	7
Utilities with GET-RP Certification	18
Plants with GET-RP Certification	31
Events Analysis	
Event Reports Reviewed	9,769
O&MRs Released	56
SERs Released	87
SOERs Released	9
Special Assistance Visits	60
NTOL Assistance Visits	6
Good Practices Developed	26
*Emergency Preparedness Review and Assistance Visits	11
Technical Reports Produced	48
Loanees on Staff	54
International Liaison Engineers on Staff	7
Permanent Employees	301
Workshops Held	14
Workshop Attendees	1,615
Scholarships	
Number Awarded	200
Dollars Spent	$300,000
Fellowships	
Number Awarded	38
Dollars Spent	$304,000

*Emergency Preparedness Review and Assistance Visits became a part of operating plant evaluations in mid-summer 1983.

Evaluation Programs

Of INPO's many programs and activities, evaluations are the "granddaddy" of them all. Started when the Institute was still in its formative months, this activity has grown and matured during its four-year history.

In April 1983, the third round of operating plant evaluations was kicked off. Although corporate evaluations remain an assistance function, they have developed in scope and experience and have become an important part of the total evaluation package. The most significant development in evaluations, however, occurred in January 1983 when INPO was ordered by its Board of Directors to begin phase two of construction project evaluations, or CPEs.

Operating plant evaluations

Based on the knowledge gained from two cycles of operating plant evaluations and early third-round experience, improvements were made during the year in evaluation techniques.

Construction project evaluations were an action item at INPO during the year. Here at Northeast Utilities' Millstone 3, workers complete fit-up measurements of the support framework for the ventilation stack. Upon completion, the structure will serve as a ventilation duct between the turbine and auxiliary buildings.

Follow-up to INPO recommendations was given added emphasis during the third-round reviews. The evaluation teams more closely examined the status of utility responses to previous findings. INPO wanted to determine if timely and effective corrective actions had been put in place since the last evaluation.

In addition, more team members became involved in follow-up of utility response to Significant Operating Experience Report recommendations. The operational experience evaluator increased the depth of reviews by extending his time spent on site from one week to two.

To improve the effectiveness of evaluations, including a better exchange of information between the evaluation team and utility personnel, some significant changes were initiated.

The evaluation process is now conducted over a four-week period, with the first two weeks devoted to the on-site visit. During the third week, the evaluators return to INPO to write up findings and recommendations. This approach allows more efficient use of the team's time while on site. Although an informal but detailed briefing of the plant manager and his key staff members is conducted at the end of the second week, the exit meeting between INPO and utility representatives is held the fourth week of the evaluation. With this method, actual evaluation time has increased by approximately 25 percent.

A data collection program was begun in an effort to measure plant performance quantitatively. Some data is collected on site by the evaluation teams, while other data is assembled from existing hard copy and computer sources. Industry averages as a whole and within like categories of plants will be calculated and fed back to member utilities.

In June 1983, a review of emergency preparedness (EP) was included in plant evaluations. Until then, EP had been carried out as an assistance function. Also, simulator training activities have been included in the scope of plant evaluations.

During the year, *Performance Objectives and Criteria for Plant Evaluations* was updated, as were *Recurring Findings, Recommendations and Good Practices* and *Foremost Safety and Reliability Issues*.

Corporate evaluation assistance visits

As noted previously, evaluations of corporate activities are continuing in the assistance mode until INPO gains experience and refines evaluation techniques. It is INPO's goal to make these reviews more performance-oriented by tying them closely to problems observed at the plants. This way, it can be determined if these problems are related to corporate support and monitoring.

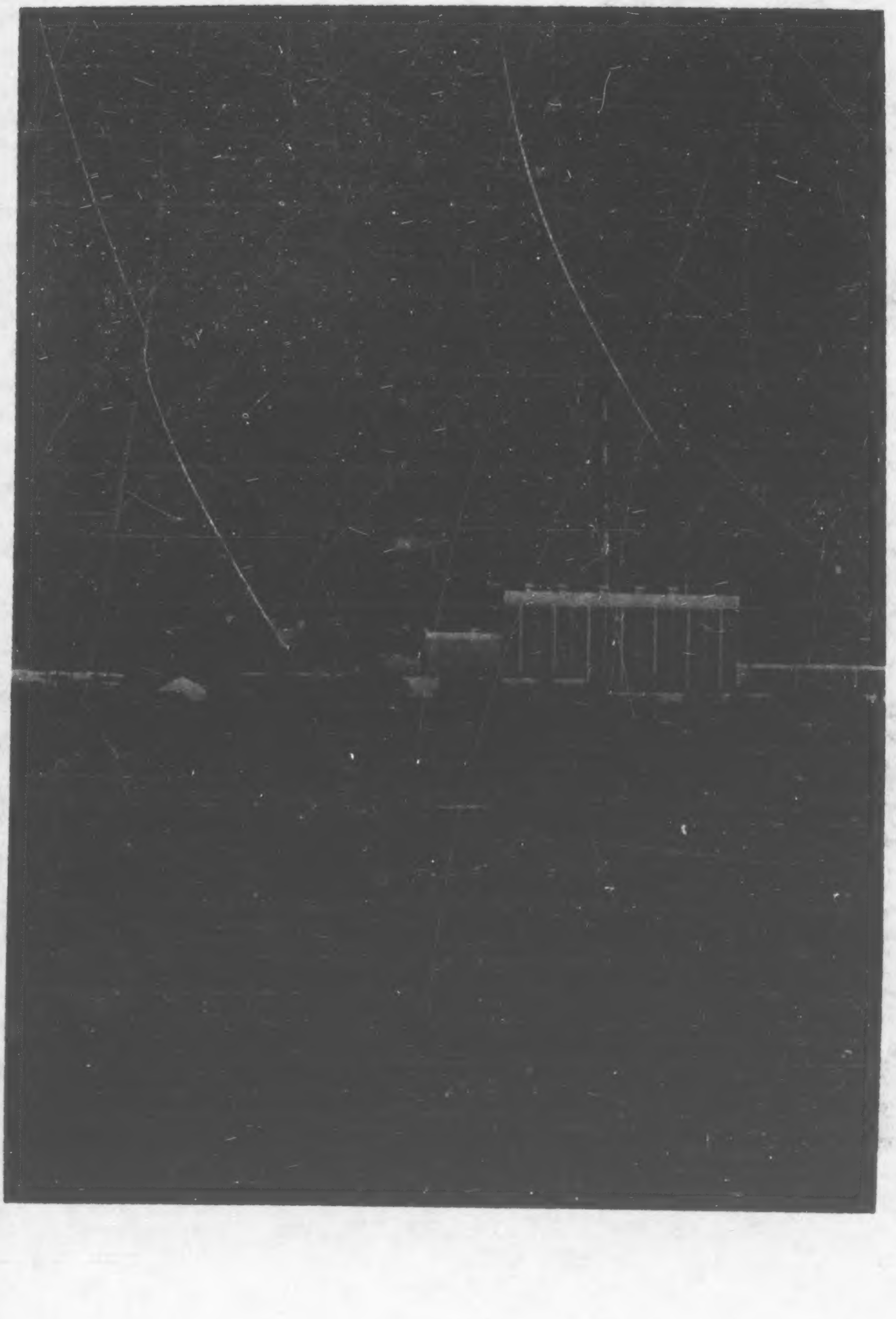
Scheduled the second week after the operating plant evaluation, the focus is on corporate interaction with and support of the plant. The exit meeting is held at the same time as the plant exit. At year's end, 13 corporate evaluation assistance visits had been conducted.

Construction project evaluations

The most notable new activity in the evaluations arena came in January 1983 when INPO's Board of Directors held a special meeting to decide on the Institute's future involvement in the evaluation of construction projects. With backing from the nuclear utility industry, the board unanimously decided that INPO would continue management of construction project evaluations.

The CPE program scope covers a project from the design input through construction and testing. Within these areas, 35 performance objectives are defined, each supported by a number of specific criteria provided to make the evaluations performance-oriented. The program focuses on evaluating the quality of the product being achieved through the implementation of project systems and procedures.

Structured to provide an across-the-board, in-depth look at the quality of results being achieved in construction and design control, the CPE program made progress in 1983. By the end of the year, seven construction projects had been evaluated formally. In addition, *Performance Objectives and Criteria for Construction Project Evaluations* was published.



Northeast Utilities, a Believer and Backer of Evaluation Programs

Northeast Utilities (NU), located in the rolling countryside 10 miles southwest of Hartford, Connecticut, is a veteran when it comes to INPO evaluations. They should be. Their Connecticut Yankee station has undergone three operating plant evaluations—in March 1981, April 1982 and June 1983. Millstone, with its two operating units, was evaluated in August 1981 and again in December 1982.

The New England utility also volunteered to be INPO's first pilot for corporate evaluation assistance visits and was the third utility, with Millstone 3, that INPO reviewed in its Construction Project Evaluation (CPE) Program.

Refining the evaluations

John Opeka, vice president of Nuclear Operations at NU, has noted a difference in INPO's evaluation process since it began in 1980. Speaking of the operating plant reviews, he observes, "When INPO first started evaluating operating plants, they seemed to be looking at whether we had programs to meet the criteria. With later reviews, we've noticed evaluations are more results-oriented."

Continuing, Opeka says that he feels this new approach provides a better product and perspective of how the plant is doing in terms of operating safely and reliably.

This performance-oriented approach did not just happen. After the first round of evaluations—completed by the end of 1981,—INPO realized that more attention should be focused on results and performance. Thus, the methodology was altered to reflect this new philosophy.

John Opeka

Opeka, who has been associated with NU for more than a decade, has observed other improvements in INPO evaluations. Commenting on the evaluation team members, he says, "The professionalism and experience level of the people have increased significantly. From our people, there are few, if any, comments on the capabilities of the evaluators. That's not even a subject anymore."

Opeka also notes that a good evaluation is more often than not a result of much homework and preparation by the utility. Before NU's first review, the utility performed a self-evaluation using INPO criteria. They improved or corrected some of the deficiencies that were found.

"But now," comments Opeka, speaking from the experience of five evaluations, "we find that taking corrective actions by the dates we committed to is sufficient. We do not need to perform a separate evaluation of ourselves before a review, other than to ensure appropriate action has been taken on the previous findings."

He adds that NU keeps close tabs on findings and recommendations from the last evaluation. This way, they know what to expect on recurring findings that are in the process of being resolved. "Hopefully," he stresses, "the actions we have taken are addressing the root cause of a problem and are not just 'window-dressing' the finding."

Experience reaps results

Addressing the topic of future evaluations, Opeka believes INPO is putting emphasis where it should. "Look at results, look at the operation of the plant, look at the material condition of the plant—the morale and other factors," he says. "I feel the evaluators are doing that, at least much more than they did in the first few audits."

Whereas INPO's operating plant evaluations have gained the needed expertise from nearly four years of experience, two other evaluation programs are undergoing the often difficult process of maturing—specifically, the corporate evaluation assistance visits and the construction project evaluations.

Looking at corporate

Bill Counsil is senior vice president of Nuclear Engineering and Operations and has been a consistent supporter of INPO and its programs. However, he also recognizes areas in which INPO needs to improve.

Sitting in his office at corporate headquarters, Counsil looked back on INPO's first pilot corporate visit in April 1982. "The team members were unsure of themselves. They did not know where to look," he remembers. "Quite often, I had to lead them to areas I felt needed help. But keep in mind, this was the first pilot. It was not even a formal visit. Since that time, INPO has greatly revised how they look at the corporate structure and its support of the plant."

Counsil predicts that the present corporate methodology may still change and improve. "I am not certain," he notes, "that enough days are included to evaluate a corporation. At NU, for example, much of the work that is done in support of a plant is done at the corporation. And I don't think that any organization in this country could come in and evaluate the corporate side of Northeast Utilities in four days."

Bill Counsil

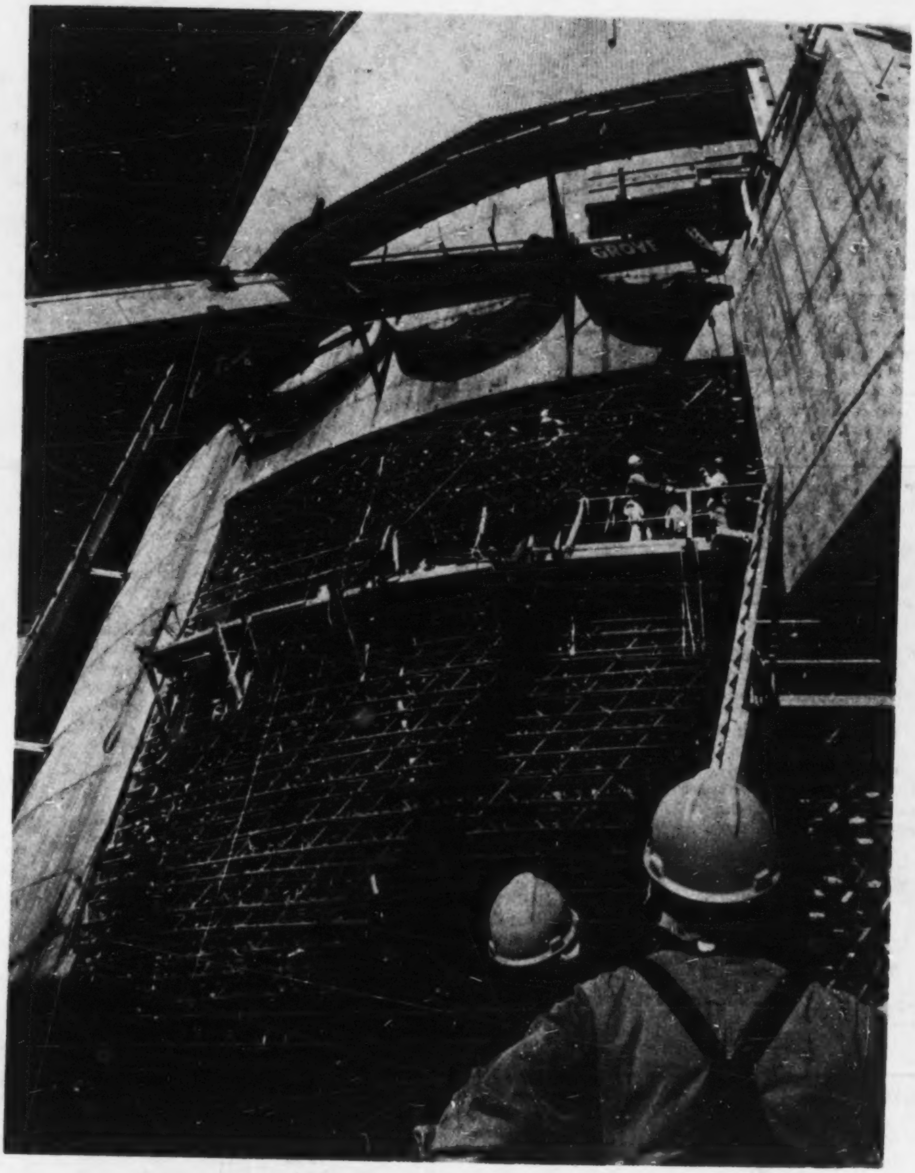
Stating that he is aware that corporate visits are still being conducted as an assistance function, Counsil goes on to say he believes they must eventually become a part of the formal evaluation process. "You can't just evaluate the plants," he emphasizes. "Soon a corporate evaluation must be included. Plant performance is predicated on the corporate attitude.

"If, in fact, the plant does not have an acceptable attitude, that attitude stems from what the corporation is doing to the plant. Corporate is not supporting the plant, and that lack of support can come in various ways—tight budget restrictions so they can't do the things they ought to be doing, lack of personnel support or an attitude that management just doesn't care."

Caring management vital

Counsil sums up his support of corporate evaluations by saying that as an industry, corporate management must be involved. "We want to know what's right or wrong, how to do it better, how to do it cheaper if we possibly can," he says. "And that is all-caring management. That infuses the entire organization."

Reinforcing steel bars must be installed prior to pouring concrete for the containment building. At Millstone 3, design specifications call for seven layers of reinforcing bar. Here, work is in progress for the closure of the containment construction opening.


GROVE

Northeast Utilities, a Believer and Backer of Evaluation Programs

CPEs, a much-needed service

Dick Werner, NU's vice president of Generation Engineering and Construction, echoes Counsil's management philosophy regarding involvement—this time pertaining to preparing plant personnel for INPO's construction project evaluation at Millstone 3.

Stressing that they wanted plant personnel to be ready for the CPE, Werner says that Millstone had gone through its self-evaluation last summer. They also gleaned feedback from other utilities at which INPO had performed a CPE.

Werner goes on to say that Millstone took the experience from other utilities and used the results as guidelines to get prepared for the INPO evaluation. The station also looked at its own self-evaluation to determine if it had made improvements in identified areas or if it had the same basic problems.

Additional preparation for the CPE involved a mini-evaluation in conjunction with Stone and Webster, which is handling all of NU's engineering and construction. Werner explains that this process, which was conducted about three weeks before the INPO evaluation, "set a frame of mind of what to expect to make the evaluation process a little bit easier."

The station also provided an engineer to be a part of the INPO evaluation team, something that INPO encourages.

The pre-visit work paid off. Werner, who has been through much of the nuclear construction at NU, comments, "Members of our management had dealt with INPO not only with the operating plants but also with the corporate pilot. So, we had a reasonable idea of what to expect."

Werner says that the plant personnel were instructed to answer the questions as honestly as possible and to make sure their responses were understood clearly by the evaluators. "We did not want misconceptions to arise and come out of the evaluation program," he emphasizes.

Since Millstone 3 was only INPO's third formal CPE and the Institute obviously had a lot to learn, what benefit was the evaluation to NU? "I believe," says Werner thoughtfully, "that it was a confirmation of the things we felt we should improve upon. It dittoed many of our own opinions of our weaknesses and the areas in which we had some work to do."

Evaluating an evaluation

After the INPO team departed, Millstone personnel performed an evaluation of INPO's evaluation. The findings? Says Werner, "Overall, they were generally good. At the time, INPO was new in CPEs. Without sounding too negative, it seems that an inordinate amount of time was spent on details."

Dick Werner

Werner says that he thinks a better approach would be to focus more attention on specific systems or components and to examine the engineering, design, procurement and construction process from beginning to end. This way, INPO could determine whether all processes were done correctly.

In summarizing the CPE visit, Werner stresses that it was helpful in that "it created an awareness that, by gosh, maybe we aren't perfect. We think we have an excellent project, but sometimes you can get too close and miss the obvious. That is one of our main concerns."

Werner, like INPO, realizes that experience is the best teacher in any new undertaking. As he stresses, evaluations of construction projects are needed and not only from the regulatory perspective. With industry support, INPO has undertaken that commitment.

Installation of equipment is just as involved as facility construction. At right, a worker is attaching a shackle to an eyebolt for lifting this piece of equipment, a generator turbine diaphragm.

Accreditation and Training Programs

Many jobs in the nuclear industry require an especially skilled person with the education, training and experience necessary to ensure competence on the job. From the point at which utilities hire employees for these jobs, through the development and implementation of the training programs, and on through the evaluation of the programs, INPO has been assisting its member utilities in developing a systematic approach to training.

The Institute's training and qualification guidelines provide an overall blueprint that describes the scope of employees' needed qualifications and training. Performance-based training system development is the recommended method for filling in the details. Through job and task analysis (JTA) and the training system development (TSD) model, INPO assists its members in developing and implementing performance-based training.

Accreditation provides the external verification of the programs—a method of evaluating and improving training systems.

A separate program is the Institute's General Employee Training Program in Radiological Protection (GET-RP). This program provides two services to participating plants.

Simulator training is an integral part of licensed operator and operator requalification training programs at Duke Power Company's Oconee Nuclear Station. These were among four programs accredited in August 1983.

First, standardized examinations covering non-plant-specific radiological protection subjects are distributed each quarter. Second, review visits are conducted to assist the plant in achieving the highest standards in GET-RP.

Training and qualification guidelines

Systematic training begins with a determination of the needed qualifications and training for a particular job. For certain positions in the nuclear industry, INPO is supporting its member utilities by publishing comprehensive guidelines that describe Institute recommendations for training and qualification programs. The work in 1983 included developing new guidelines and revising previously issued guidelines.

INPO developed training guidelines during the year for quality control inspectors who check work in such areas as civil and mechanical engineering, welding, electrical systems, instruments and controls, and nondestructive examinations.

Also, the Institute modified and updated previously issued training and qualification guidelines for pressurized water reactor (PWR) control room operators, senior control room operators and shift supervisors.

Performance-based training system development

With training and qualification guidelines providing a "broad picture," INPO helps utilities with training program details by conducting job and task analyses and by providing a TSD model.

During 1983, INPO continued to assist utilities in designing training programs based on job performance requirements—by conducting job and task analyses to build an industrywide data base, assisting utilities in the retrieval and use of this information, and developing a comprehensive model for implementing performance-based training.

Job and task analysis projects were completed for the boiling water reactor (BWR) control room operator position and for instrument and control technician positions. Job analyses were completed for a number of positions at both PWR and BWR plants—shift supervisor, senior control room operator, plant equipment operator, and mechanical and electrical maintenance technicians. In addition, task analysis was begun for the plant equipment operator positions, with completion slated for mid-1984.

Job analysis produces a detailed listing of the duties and tasks of a specific job and is the first step in obtaining data required for task analysis. Task analysis is a systematic process of deriving information to identify the task conditions, performance standards, elements, and required skills and knowledges.

For example, the BWR control room operator job analysis identified 330 tasks that were selected for task analysis. Task analysis identified several thousand skills or knowledges needed to perform those tasks. Then, this information was integrated into a structured, computerized data base.

Throughout the year, the Institute has assisted member utilities in setting up a computer retrieval capability for the JTA information—26 utilities have established the on-site retrieval capability. Special assistance visits were also conducted to help members acquire this capability, utilize the data to conduct plant-specific analyses and develop training programs.

The Institute published three training-related manuals that can be useful to members: *Job and Task Analysis User's Manual*, *Job and Task Analysis Retrieval Manual* and *Job and Task Analysis Procedure*. Using these documents, utilities are retrieving the analysis results, adapting them to reflect plant-specific conditions and integrating them into training program design.

The use of JTA data to determine job requirements is the first part of the five-step TSD model—the final four steps are the design, development, implementation and evaluation of performance-based training systems. In 1983, the Institute completed a draft of a manual describing the TSD model. This manual will provide guidance to utilities in establishing performance-based training.

Accreditation program

Utility application of the systematic approach to training is evaluated through the INPO accreditation process. The accreditation program got off the ground in mid-1982 with the publication of the accreditation criteria, the basic road map for this formal method of attaining recognition of quality training programs—and the hard work finally began to pay off in 1983.

The Accrediting Board, an independent, five-member panel of utility professionals, industrial training experts and professional educators, met for the first time on January 20, 1983.

The first utility training programs—four operator programs at Duke Power Company's Oconee Nuclear Station—were awarded accreditation by the Accrediting Board on August 17.

The event was especially significant because it was the first time a utility, INPO and the Accrediting Board saw the completion of the three-step accreditation process—self-evaluation, accreditation team review and the board's decision.

Special teams from INPO's Accreditation Department conducted 23 visits to utilities to help with self-evaluations, both before and during the self-evaluation process.

A one-day "peer evaluator" training program to prepare utility personnel to take part in accreditation team evaluations was developed. In conjunction with this training, INPO acquired the services of a "pool" of 66 peer evaluators for use on future accreditation reviews.

Accreditation review teams made seven visits to utilities in 1983. Each team spends a week taking an in-depth look at the training programs, process and staff and compares these elements to the accreditation criteria. A team usually consists of a team leader, three to five INPO evaluators and three to five utility peer evaluators.

The progress made in 1983 was meaningful—utilities, INPO and the Accrediting Board worked together to reach a major milestone for the accreditation program.

General employee training in radiological protection

From all indications, utilities are finding merit in INPO's GET-RP—participation climbed steadily in 1983.

This program is voluntary and is provided as a service to Institute members. Its purpose is to help ensure that workers have the knowledge and skills to work efficiently and safely in a radiological environment. In addition, participation can help reduce training costs and increase productivity by minimizing redundant training.

Member utilities first compare their own GET-RP program to the INPO GET guidelines, which were issued in February 1982. If the training program content meets the intent of the guidelines, the utility can then certify the program as such.

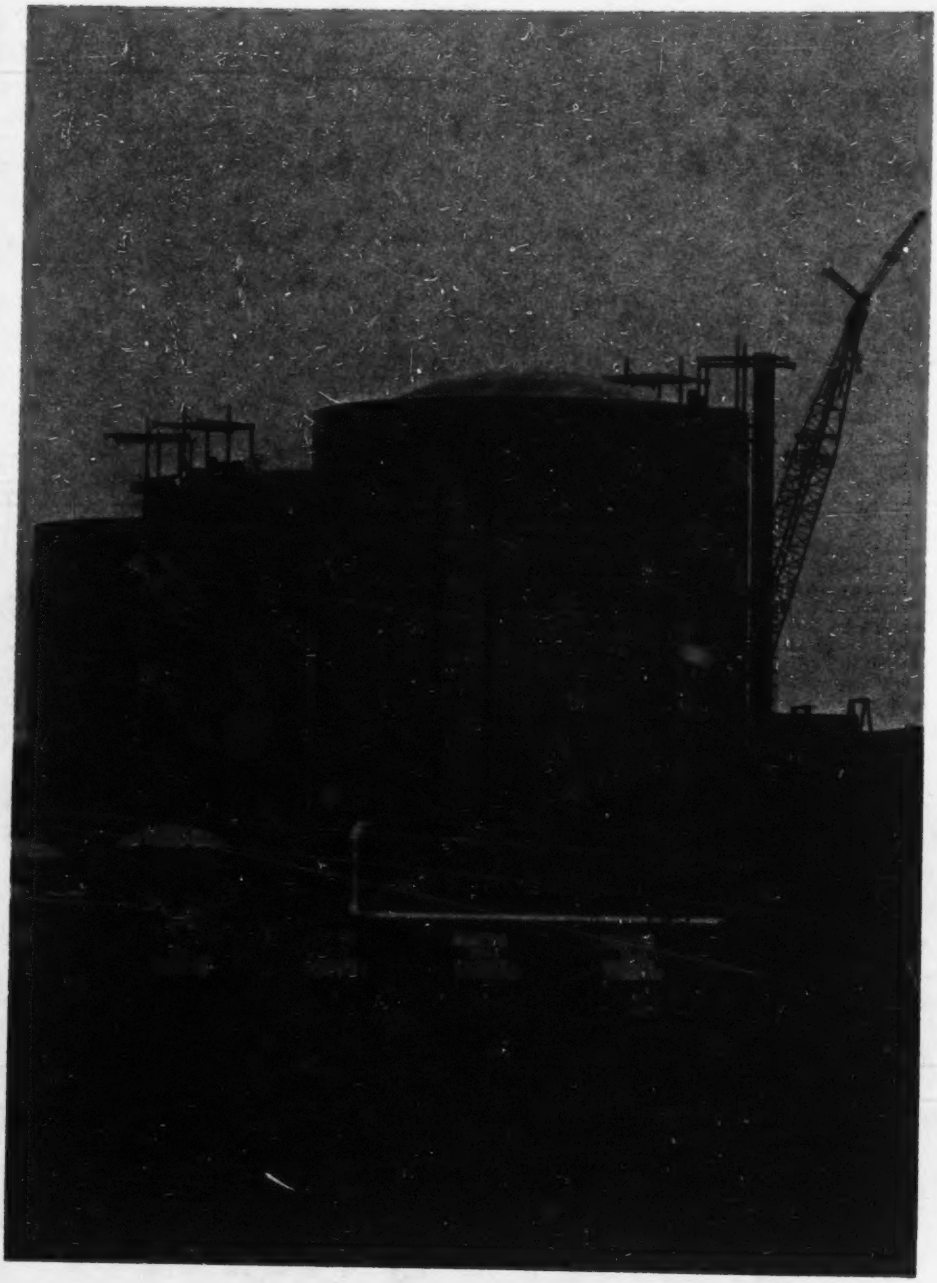
The Institute provides each utility that has certified its GET-RP program with six 50-question radiological protection examinations each quarter. In 1983, INPO published both the *General Employee Training in Radiological Protection Examination Administration Manual*, which explains how the exams are to be administered, and the *General Employee Training in Radiological Protection*.

During the third round of plant evaluations, INPO personnel or qualified industry representatives conduct a special on-site review visit; its purpose is to review the GET-RP program and identify any areas needing improvement. However, the plant's GET-RP program will be subject to findings during the evaluation, based on the applicable performance objectives and criteria, as with other training programs.

INPO and industry representatives conducted 12 review visits in 1983, and 31 plants have certified that their GET-RP programs meet the intent of the guidelines.

In September, the GET-RP working group—composed of six utility representatives with expertise in radiological protection and/or training—revised and updated the GET-RP question bank, based on the experience they gained from approximately one year's use of the examinations. This revision improved the quality of the question bank.

Two Oconee employees vent control rod drives on the reactor vessel. Teaching the correct procedures during training contributes to the plant's safety and reliability.



Oconee's Accreditation: An Industry First

Utilities and INPO are working hand-in-hand for the safe and reliable operation of the nation's nuclear plants. One example of this joint effort is the close working relationship between the Institute and Duke Power Company in accreditation and training.

On August 17, 1983, four operator training programs at Duke's Oconee Nuclear Station in South Carolina were awarded accreditation. These programs—licensed operator, non-licensed operator, licensed operator requalification and shift technical advisor training—were the first to be accredited in the nuclear utility industry.

The people at Oconee and at the company's corporate headquarters in Charlotte, North Carolina, also worked closely with INPO when the Institute developed its standardized General Employee Training Program in Radiological Protection (GET-RP).

These examples of INPO-utility interaction are part of the industrywide drive to develop top-notch nuclear training programs.

Training the operator

"The number one priority of the training," says Senior Operator Training Instructor Richard Bugert, "is to make a safe, efficient operator for the company."

Duke's operator training begins at the Production Technical Services Training Center near Charlotte. There, a new employee spends one year in academic work and on-the-job training before coming to Oconee to begin qualification as a non-licensed, or nuclear equipment, operator. After this qualification, the company can select the individual to enter the plant's 38-week license preparatory reactor operator program—a combination of classroom, simulator and on-the-job control room qualification.

Once licensed by the Nuclear Regulatory Commission, the operator spends one week in five in requalification training. In addition, the operator is requalified annually on a combination of simulator and classroom examination.

Accreditation, a team effort

The first step in the accreditation process is the utility self-evaluation. According to station Training and Safety Coordinator Don Austin, the self-evaluation includes documentation of the training programs. He served as the "coordinator" for the self-evaluation team, which consisted of training, operations and administrative personnel.

"The biggest part of my job was making sure this training process made sense to an outsider," he comments, "so that anyone could look at it and see how it fit together, that it had logic according to the (INPO) accreditation guidelines."

Richard Bugert

Don Austin

The self-evaluation involves determining whether training meets established objectives, Austin notes. He described it as a "planning process."

Duke worked on the self-evaluation from mid-year 1982 until December 1982. The company then submitted the report to INPO, and in the spring of 1983, the INPO accreditation team visited both Charlotte and Oconee.

Bugert says the team spent time with the training staff; observed classroom training; and studied records, examination banks, lesson plans and training schedules.

Later in the year, INPO issued a preliminary report that included recommendations of the accreditation team. Bugert points out that the combination of the self-evaluation and the accreditation team visit helped identify several areas for potential improvement: the need for additional instructor training, an upgrade of formalized lesson plans and visual aids, and the need for a non-licensed operator requalification program.

Bugert emphasizes that the findings came as no surprise to Duke. The areas identified for improvement, he said, were either illuminated during the self-evaluation or were being discussed prior to the formal accreditation process.

"As a result of the accreditation process, however, commitments were made to specific time frames to complete the improvements," Bugert says. In fact, the utility made the decision to implement a non-licensed operator requalification program in early 1983.

"If you are committed to excellence, then there is always room for improvement," Bugert adds. "Accreditation gives you a technique for identifying improvements and committing to their implementation."

RP training a priority

Training that teaches employees how to work safely and efficiently in a radiological environment—GET-RP—gets a lot of attention at Oconee.

The company reserves intensive GET-RP training for those workers who do the "hands-on" work in the radiation-controlled areas, Training and Safety Coordinator Austin says.

In an extensive practical portion of the training, these workers learn how to dress out and how to control wastes and the spread of airborne contamination. Following this initial training, the company requires that they pass an annual examination in radiological protection to bypass a yearly repeat of the initial training.

"We're still using the same principles," Austin points out. "Time, distance, shielding and a common-sense approach to protection."

Oconee was involved in the initial verification of INPO's standardized GET-RP. In other words, Austin notes, INPO looked at the GET-RP programs at Oconee and other utilities to validate the GET-RP review process. Oconee later certified that its program met the intent of these guidelines.

Oconee uses questions from INPO's GET-RP examination bank to draw up its bypass examination, he says. Another benefit derived from the program is that Duke can have some assurances of the level of GET-RP for a new employee, provided that employee comes from a utility that also has certified its program as meeting the INPO guidelines. With written proof of such training, the worker automatically is admitted to the Oconee bypass examination.

Bob Koehler

Only if one fails the exam does the worker have to go through what Austin calls the "full-blown" radiological protection training. All workers still receive site-specific training, however.

Austin sees the value of the program in that management can reduce training costs.

"We have been able to reduce that additional training quite a bit," he notes. "And the workers get in there and get to work much quicker."

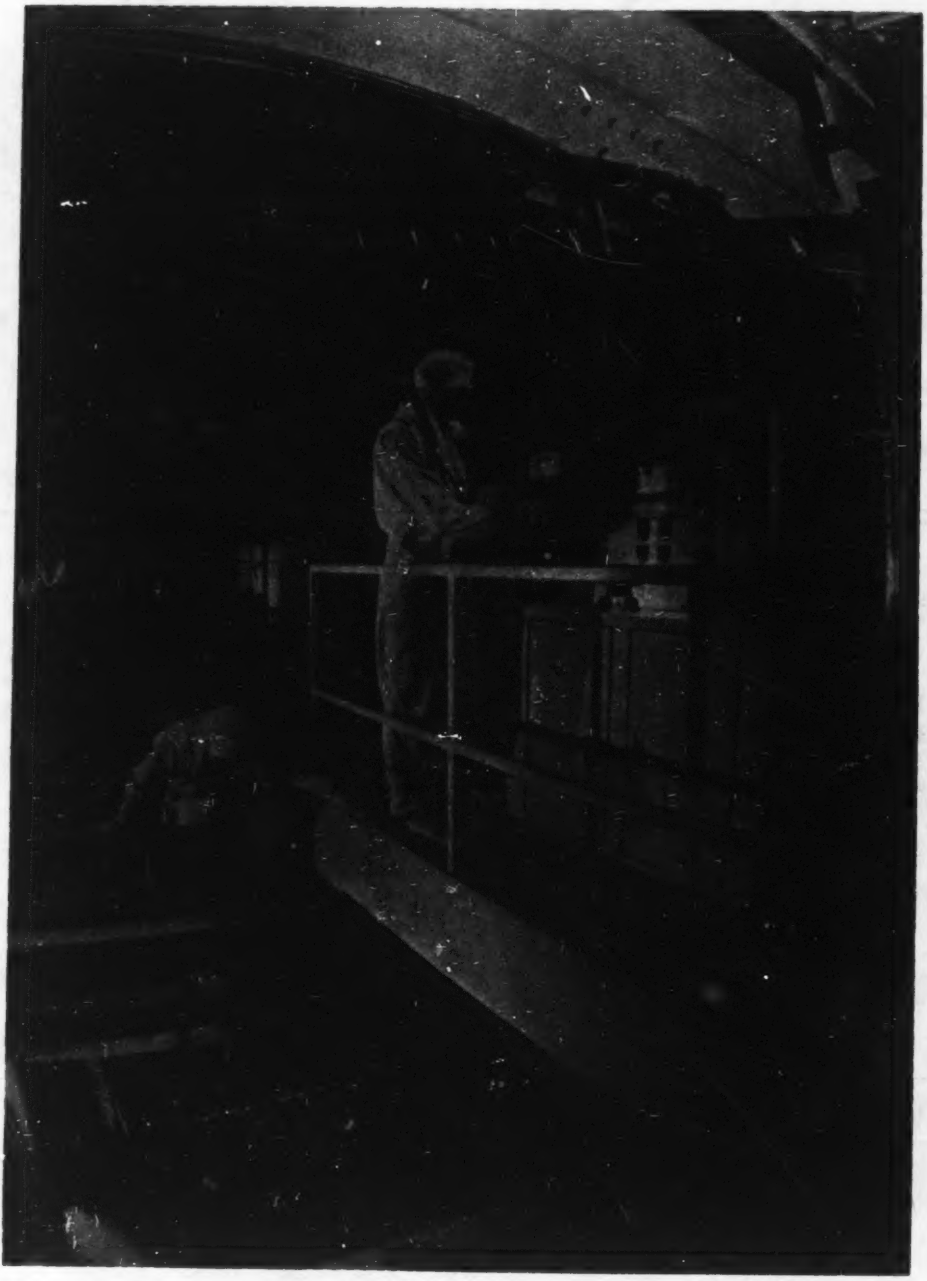
And why is quality GET-RP important? As Austin puts it, "Our people need to know that we provide them with proper protection to work safely in the plant."

Management support the key

Bob Koehler, Duke's manager of Production Training Services, says success in training and accreditation hinges on management support—particularly the assignment of resources necessary to "get the job done."

"We've got a lot at stake in what we are doing," Koehler stresses. "The training of people is an important job. I'm confident that the nuclear power industry is only going to be as good as the people doing and managing the training."

Working safely and efficiently near the spent fuel pool at Oconee requires special radiological protection skills and knowledge. Workers get the necessary training in the plant's GET-RP program.



Events Analysis and Information Exchange Programs

From the time it was established, INPO has emphasized in its policies and programs the importance of sharing information. The fact that every nuclear plant has valuable information to share is a lesson learned over and over again.

To ensure that members and participants get the information they need, INPO administers a number of programs: the Significant Event Evaluation and Information Network (SEE-IN), NUCLEAR NOTEPAD,™ the Nuclear Plant Reliability Data System (NPRDS) and a number of data bases.

Each of these programs improved in 1983. Each gained greater acceptance from members and participants. Individually and collectively, they are achieving results and, in the long run, contributing to greater reliability and safety in the nuclear utility industry.

During 1983, the interactive data entry system for NPRDS became available. This system allows utilities to enter NPRDS data directly into the INPO computer.

Significant Event Evaluation and Information Network

INPO was assigned the sole responsibility for the SEE-IN program two years ago. SEE-IN is an industry program. It was developed because the nuclear utility industry recognized that relatively minor, non-accident events that occur in power plants can be, and often are, indicators of potentially more serious events. Through the program, INPO compiles plant experience data, systematically analyzes it and communicates significant lessons learned to members and participants.

During 1983, SEE-IN expanded. Event reports that were reviewed totaled 9,769, approximately twice as many as the year before. From these event reports, INPO developed 56 Operations and Maintenance Reminders, 87 Significant Event Reports and nine Significant Operating Experience Reports.

SEE-IN also expanded in the area of construction projects. The Institute initiated a formal review of construction failure reports and began evaluating operating experience review programs during construction project evaluations. This expansion was the result of the industry's awareness that construction events can affect future operations, and the ideal time to implement lessons learned from operating experience is during the construction phase of a nuclear power plant.

SEE-IN review of NPRDS failure reports began in 1983. During the year, the number of failure reports reviewed increased fourfold due to more comprehensive NPRDS reporting.

Also during 1983, more operating experience was shared by international participants. This increased participation will help make SEE-IN a truly worldwide program.

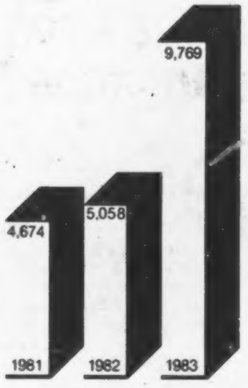
NUCLEAR NOTEPAD

During the year, NUCLEAR NOTEPAD made impressive gains in usage. Since 1981, member usage hours per month have increased by 70 percent, from 775 hours in 1981, to 940 hours in 1982, to 1,319 hours in 1983. Messages exchanged on the system averaged 1,400 per month during the year.

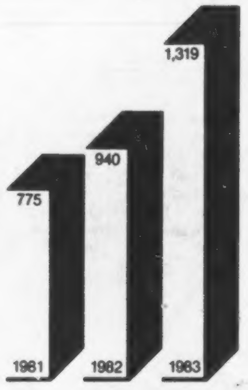
NUCLEAR NOTEPAD users can make public entries or exchange private notes. In 1981, 25 percent of the messages transmitted on the system were public. This increased to 38 percent in 1982 and to 46 percent in 1983. This increase indicates a greater willingness on the part of utility NOTEPAD participants to share more information on the open channels with their counterparts in the industry.

As 1983 ended, the nuclear utility industry was being prepared for the introduction of NUCLEAR NETWORK™, an electronic communications system that will replace NUCLEAR NOTEPAD in January 1984.

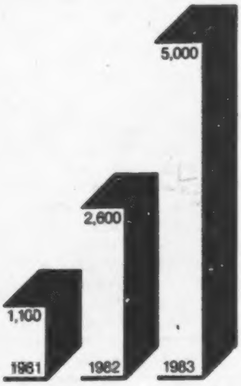
NUCLEAR NETWORK has been developed to keep up with the changing demands of the industry. Unlike NUCLEAR NOTEPAD, the software for NUCLEAR NETWORK is owned and managed by INPO. NUCLEAR NETWORK has many features that have been requested by the industry and uses a modern computer language that can be modified easily.



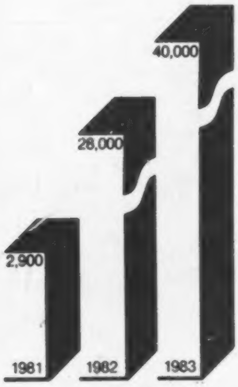
Event Reports Reviewed



NUCLEAR NOTEPAD
Member Usage Hours
Per Month
(Public and Private)



NPRDS Failure Reports



NPRDS Component Engineering Reports Submitted During the Year

Nuclear Plant Reliability Data System

Efforts at making NPRDS easier for members to use paid handsome dividends during 1983.

To help member utilities enter more engineering data on their plant systems and components into the data base, INPO published a manual that defines the data NPRDS requires for each of the nuclear steam supply systems. Using this manual, called the "Scope" manual, utilities can tell if they have entered correct data and what additional data should be entered. The overall objective is to achieve uniform reporting on plant systems and components throughout the industry.

Even more noteworthy was the interactive data entry system introduced July 1. This user-friendly computer system enables members to enter failure reports directly to the INPO computer from terminals in their own plants. By the end of the year, all of the reporting plants had interactive data entry capability.

Preparation for the transfer of the NPRDS data base from the Southwest Research Institute to INPO was a third area of activity. This transfer took place July 1. Indoctrination in the use of the new data base programs began in the fall and will continue in 1984. With this indoctrination, INPO members or supplier participant personnel learn how to dial up the INPO computer, gain access to the NPRDS data base and retrieve failure information.

The result of these efforts has been a major increase in NPRDS usage. Seventy-four units have entered engineering reports. The number of engineering reports now in the data base increased from 168,000 in 1982 to 208,000 in 1983. This number is expected to total 300,000 by the end of 1984.

Input of failure reports is even more impressive. During the year, 69 plants entered approximately 5,000 failure reports. This is more than four times the number submitted in 1981, the year before INPO was assigned management responsibility of NPRDS, and almost twice the number submitted in 1982.

In addition to increased numbers, there has been improvement in the timeliness of failure reporting. For the first time in the history of NPRDS reporting, failure reports are being submitted within a short time of their discovery date. This improvement is another indication of an easier-to-use system.

Diagnostic equipment in the control room at Davis-Besse allows the monitoring of reactor coolant motor and pump degradation. The installation of this kind of equipment was recommended in INPO's SOER 82-5.

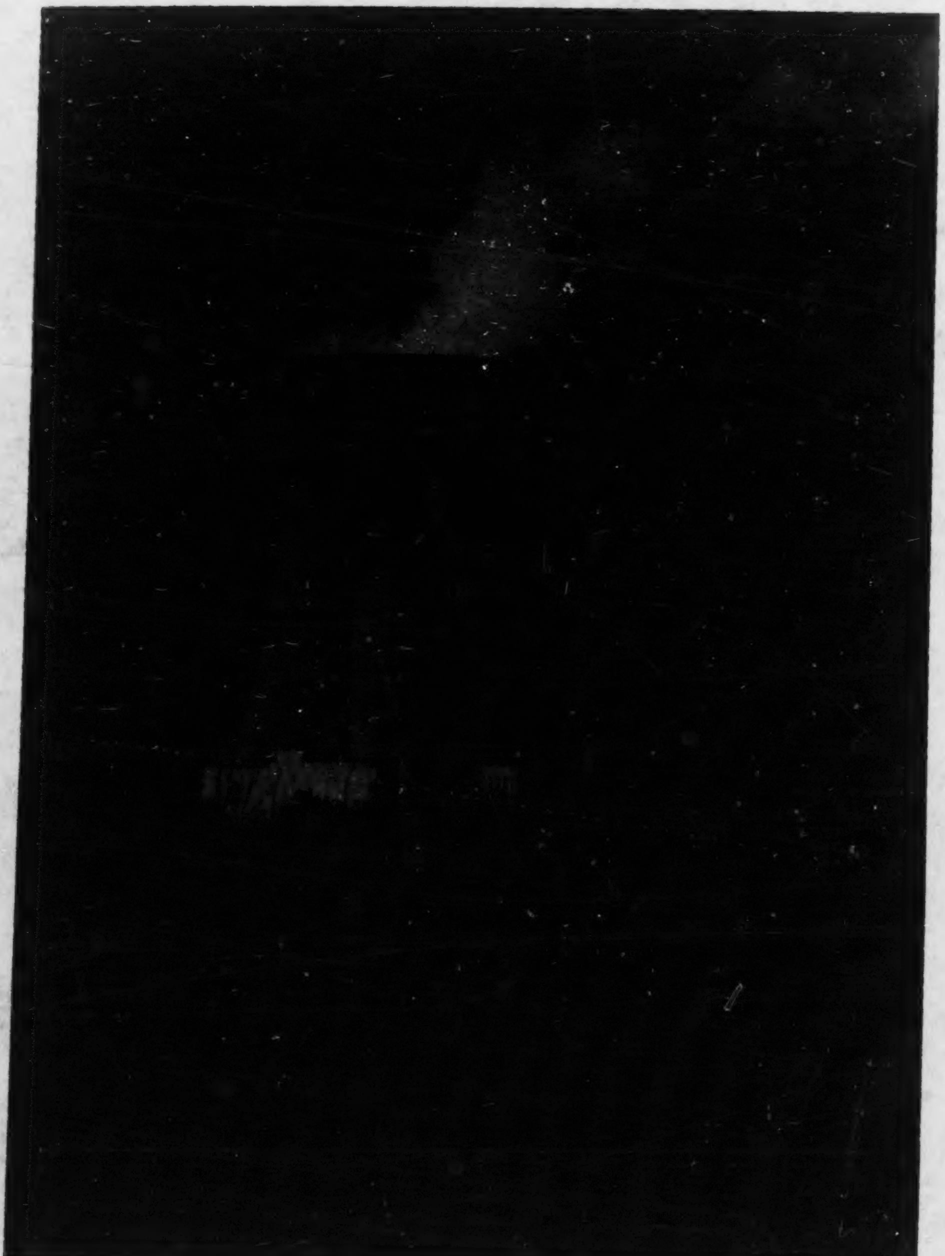
INPO data bases

INPO members and participants became more aware of what the Institute's data bases have to offer during 1983. As a result, usage soared.

Although the Institute maintains many data bases, members and participants are concerned with six major ones. Each is accessible by a local phone call into a data network linked to INPO's computers.

These data bases are the Licensee Event Report data base, the NPRDS, the Job and Task Analysis data base, the Nuclear Regulatory Commission data base, the plant data base and the technical library data base.

During 1983, the number of calls to the data bases doubled, reaching an average of 64 calls per day. The heavy usage has necessitated a need for more computer processing power. As the year ended, the Institute had on order an additional, more powerful Prime computer. This computer will provide for the continued responsiveness of the system to calls by members and participants.



Events Analysis "a Matter of Prudence" at Davis-Besse

The philosophy is echoed at businesses across the country. "We're investor-owned. People are interested in making money, not wasting it. It is our job to operate this place safely, efficiently and economically."

This is how Terry Murray concluded his observations about events analysis. Murray is the station superintendent at Toledo Edison's Davis-Besse Nuclear Station.

Like most businessmen, Murray has no tolerance for programs that do not pay off in a tangible way. Providing goods or services at a profit is what business is all about.

Using resources for profits

Murray sees a relationship between events analysis, programs like INPO's SEE-IN (Significant Event Evaluation and Information Network) and NPRDS (Nuclear Plant Reliability Data System), and the company's profit.

"Events analysis," he says, "is something any prudent manager has got to take advantage of because of the cost in time and dollars of not doing so. If you don't take advantage of learning from other people's experience, then you have to go through their experience to learn yourself. That is not a prudent way to operate."

Murray says that events analysis is multifaceted. The variety of programs at his plant attests to his belief.

For example, Davis-Besse is an active participant in NPRDS. NPRDS collects reliability information on safety-related systems and components in nuclear power plants and provides one input to the SEE-IN review of operational data.

Rescoping NPRDS data

At Davis-Besse, NPRDS is the responsibility of the Nuclear Reliability Department. They have been entering engineering and component failure data since 1978. In the last several months, the department has been going through the rescoping process, collecting new engineering data and updating the old.

The plant was one of the first to use the new interactive data entry system. This system is getting a warm reception. Employees are finding it easier and faster to enter failure data. The program coaches the user, and data is entered from a computer terminal at the plant.

After the first of the year, Davis-Besse and all other U.S. nuclear power plants will be able to use NPRDS to report most single-component failures instead of being required to file a Licensee Event Report (LER) with the Nuclear Regulatory Commission. Davis-Besse personnel say this is a welcome change. NPRDS reporting will be faster, they say, and there will be less paperwork.

Although the plant is not using NPRDS to its fullest potential yet, there is an awareness of what the system has to offer.

Recently, the plant had problems with radiation monitors. To assist the engineers in correcting the problems, the reliability staff checked with NPRDS. They found 1,000 radiation monitor reports in the system. Following this check, hard copies of the reports were requested from INPO for use by the engineers.

Terry Murray

Equipment procurement is another example of how NPRDS has been used at the plant. To help the procurement department evaluate vendors, NPRDS has been used to check on the number of component failures from specific vendors. Although this is not yet a formal procedure, the reliability staff believes this is an excellent way to use NPRDS in order to promote safety and reliability. A high number of failures on one vendor's component should be, at the very least, a warning.

SEE-IN demands attention

SEE-IN—with its Significant Operating Experience Reports (SOERs)—is a second INPO program commanding attention at Davis-Besse.

SOERs, which are developed by INPO, are drawn from significant events throughout the industry. If, after analyzing the event, INPO finds that corrective action may need to be taken at nuclear plants, an SOER providing recommendations is prepared. Utilities are expected to review SOERs when received and implement the recommendations applicable to their operation. INPO assesses responsive actions to SOERs during plant evaluations.

Events Analysis "a Matter of Prudence" at Davis-Besse

To its credit, Davis-Besse responds well. INPO evaluators report that the SOER evaluation system is both thorough and efficient.

The first person to see an SOER at the plant is vice president, nuclear, Dick Crouse, who is also INPO's point of contact at Toledo Edison. Crouse routes the SOER to the plant's nuclear regulatory coordinator, who is responsible for tracking SOERs. The nuclear regulatory coordinator sends the SOER to the shift technical adviser group. This group evaluates it to see if the recommendation(s) is applicable to Davis-Besse's operation.

When the shift technical advisers find that an SOER is applicable to the plant, one of two things occurs. A procedure is changed or something about the facility is modified. Either change can necessitate personnel retraining.

Procedural changes faster

Station Superintendent Murray explains that the approval and implementation of procedural changes are much faster than facility modifications because the latter normally requires spending money.

A procedural change, he says, can take place in a day, "if it's a super hot item. Usually, they take about a week," he adds.

Facility modifications, on the other hand, can take a couple of months, unless a change warrants emergency action. When this occurs, plant personnel walk through the approval process.

Fortunately for Davis-Besse, facility changes resulting from SOERs are rare. A proactive management and a quick response to all events have enabled the plant to make changes before SOERs are received. Nevertheless, Murray says that a major source of information factored into the plant "is what we get from INPO."

Information overkill

Looking at the review of industry experience as a whole, Murray explains that in an industry heavy with information, it is no small task to deal with conflicting information and information overkill.

When information does conflict, a plant must look at the source and the timing of the information. Some events will indicate one thing initially, but upon closer examination, something else will be found. Often, it is a case of having a later piece of information.

"When you recognize a difference in information," says Murray, "you've got to dig deeper. You always have to be careful on any event you hear about from other utilities. You have to look at your equipment and their equipment and see if the information is applicable or not."

Murray emphasizes the value of having information screened. "You have to limit yourself to the important things," he says. "If it comes to the surface from INPO or the NRC, then you know it is important."

Murray also emphasizes that the review of industry operating experience is only part of events analysis. INPO agrees with this. Internal operating experience review is another area that is examined during plant evaluations.

Dick Crouse

The analysis of internal events at Davis-Besse is just as aggressive as the analysis of industry events.

Five years ago, Dick Crouse established the LER Review Committee. This committee meets once each month to identify the root cause of every LER filed by the company and to determine what can be done to prevent the event from recurring.

Crouse explains that in addition to being reviewed by committee, LERs are tracked and analyzed on the Nuclear Mission Management Report, which is prepared monthly and sent to the chief executive officer and other members of senior management. Referring to a recent report, he notes, with considerable pride, that Davis-Besse has reduced both the number and recurrence of LERs.

Crouse points to the plant's participation in the Babcock & Wilcox Transient Assessment Program (TAP) as a way of internal and external events analysis. This program was established by Babcock & Wilcox (B&W) in 1980 for nuclear plants owning B&W reactors and other plant components.

When a transient (a significant change in the plant operation, such as a reactor trip) occurs at a participating plant, B&W normally will send two engineers to the plant. These engineers assist the plant staff in evaluating the transient data.

Then, they prepare a draft TAP report. After the TAP report is reviewed by the plant, it is completed and sent to the other participating plants by B&W.

Praise for TAP program

Those involved with the TAP program give it good reviews, praising the expertise of the B&W engineers who investigate the transient and the quality of the TAP reports.

"TAP provides frank, detailed reviews of plant transients," says one employee. "They aren't public documents. They're for circulation only within B&W units."

Adds Crouse, "TAP goes way beyond the event itself. With it, we can work jointly with other utilities for the resolution of common problems."

Clearly, Crouse is a supporter of events analysis.

"We had a lot of problems initially at Davis-Besse—a lot of equipment and hardware problems," he says. "We had to, by necessity, seriously evaluate the events we had so we could determine the root causes and take appropriate corrective actions.

"We have been able to see a tremendous improvement in our plant's reliability. Along with that, we feel better about the overall safety of the plant."

Evidence of this improvement is Davis-Besse's 93 percent availability during the last fuel cycle. "That," says Crouse, "was fantastic. And, we saw our refueling outage go according to plan and to schedule."

The strong commitment to events analysis is apparent throughout Davis-Besse. From the vice president to the station superintendent to the department superintendent to the department personnel, the attitude is the same. Applying the knowledge gained from operating events at Davis-Besse and at other plants is a prudent thing to do. The payoff comes in increased plant safety and reliability.

For the entire nuclear utility industry, this payoff is the big one.

A Davis-Besse electrical maintenance technician prepares to measure the continuity of a charging spring motor. This procedure is outlined in INPO's SOER 82-16.

Assistance Programs

Assistance programs gained solid footing in 1983. Utilities placed many more requests for special teams to study specific topics, and special teams went to plants they had not visited before. Industry working groups—known as nuclear utility task action committees (NUTACs)—continued to meet. And the Institute developed more documents, or Good Practices, to highlight sound approaches to good performance.

A variety of programs contributed to the effort in 1983.

A special assistance visit at Comanche Peak was directed toward the instrument and control program. Among topics discussed were procedures, preventive maintenance, calibration philosophy and training.

Special assistance visits

Special assistance visits—visits conducted at the request of utilities—were in increasing demand in 1983. Twenty-eight utilities requested them. These visits involve studies of a variety of programs and topics, including the following:

- operations
- maintenance
- radiological protection
- chemistry
- emergency preparedness
- training
- procedure development
- records management
- organizational plans

In former years, teams making these visits were small—most had fewer than six members. This year, the scope of some visits was broad, and a number of teams were much larger, drawing expertise from several INPO divisions.

The utilities that requested visits were seeking an objective review of a special area. The visits addressed such topics as maintenance procedures, water chemistry, operator aids and radiological protection programs. Some visits focused on topics important to a plant moving from the construction to the start-up phase.

In addition to visits made to U.S. utilities, three teams went abroad in 1983, bringing the total number of countries receiving special assistance visits outside the United States to five—Spain, Mexico, Brazil, Taiwan and Korea. Plants in these countries received assistance in training, chemistry, emergency operating procedures, radiological protection and maintenance.

NTOL assistance visits

With fewer plants under construction, only six near-term operating license (NTOL) visits were conducted this year. But these visits took on a new dimension.

Five of these visits included team members from the Construction Project Evaluation Division. These team members dealt with the turnover of plant systems from the construction to the start-up phase, while observing start-up and preoperational testing.

To allow more time during the NTOL team's visit, the visits are now longer. They are eight working days on site instead of six.

Corporate evaluation assistance visits

Corporate evaluation assistance visits coincided with plant evaluations this year. In addition, two utilities placed special requests for the visits.

The purpose of the corporate visits remained the same. As before, they concentrated on management involvement in the monitoring and support of the plant.

Radiological protection and chemistry

In 1983, the utility senior management push to improve radiological protection brought an increase in the number of special visits in that field.

The radiological assistance visits were diverse in scope. Some visits were limited to specific areas such as personnel exposure reduction efforts. Others focused on management issues. And some visits, such as those for plants nearing commercial operation, provided an in-depth examination of the operational radiological protection program.

Chemistry assistance has been no less diverse. With the continued development of INPO's chemistry program, visits to utilities have become more technical and more specific.

The goal is to maintain plant water purity along with good laboratory quality control. Team members on chemistry visits have kept a close watch on how instruments are used in the laboratory; they have assessed how well water purity is maintained in plant systems.

Emphasis on maintaining the purity of makeup water, for example, in one case resulted in a three-day visit, during which only water treatment was studied.

Management plays an important part. The key has been to find out how plant management integrates chemistry into overall operations and how well the management staff responds to chemistry concerns.

procedures. The symptom-based procedures focus on correcting the symptoms of an accident. The intent is to keep the safety functions of the plant within allowable limits, even when the basic causes of the accident, or event, may not yet be understood.

The SPDS NUTAC met several times, and, according to the guidelines laid out by the NUTAC concept, completed its work within a maximum 18-month schedule. The work was completed with the publication of an implementation guideline for obtaining, installing and operating display systems.

The CRDR NUTAC is another NUTAC that is developing guidelines. The guidelines being developed by this committee are for control room surveys, analysis of operator duties, human factors analysis and validation of procedures.

Four subcommittees of the ERC NUTAC are drawing up guidelines for setting up programs to handle emergencies. The committee's work includes such topics as facilities, proper procedures and instruments needed following an accident.

This year, one NUTAC was launched to assist the utilities in formulating an appropriate response to Section 2.2.2 of NRC Generic Letter 83-28 on vendor information and interfacing procedures. Section 2.2.2 of the letter requires that each licensee and applicant set up and maintain a program to ensure that vendor information on safety-related equipment is complete, current and controlled. As this NUTAC progresses, its goal is to suggest cost-effective ways for utilities to meet the requirements of Section 2.2.2.

More Good Practices

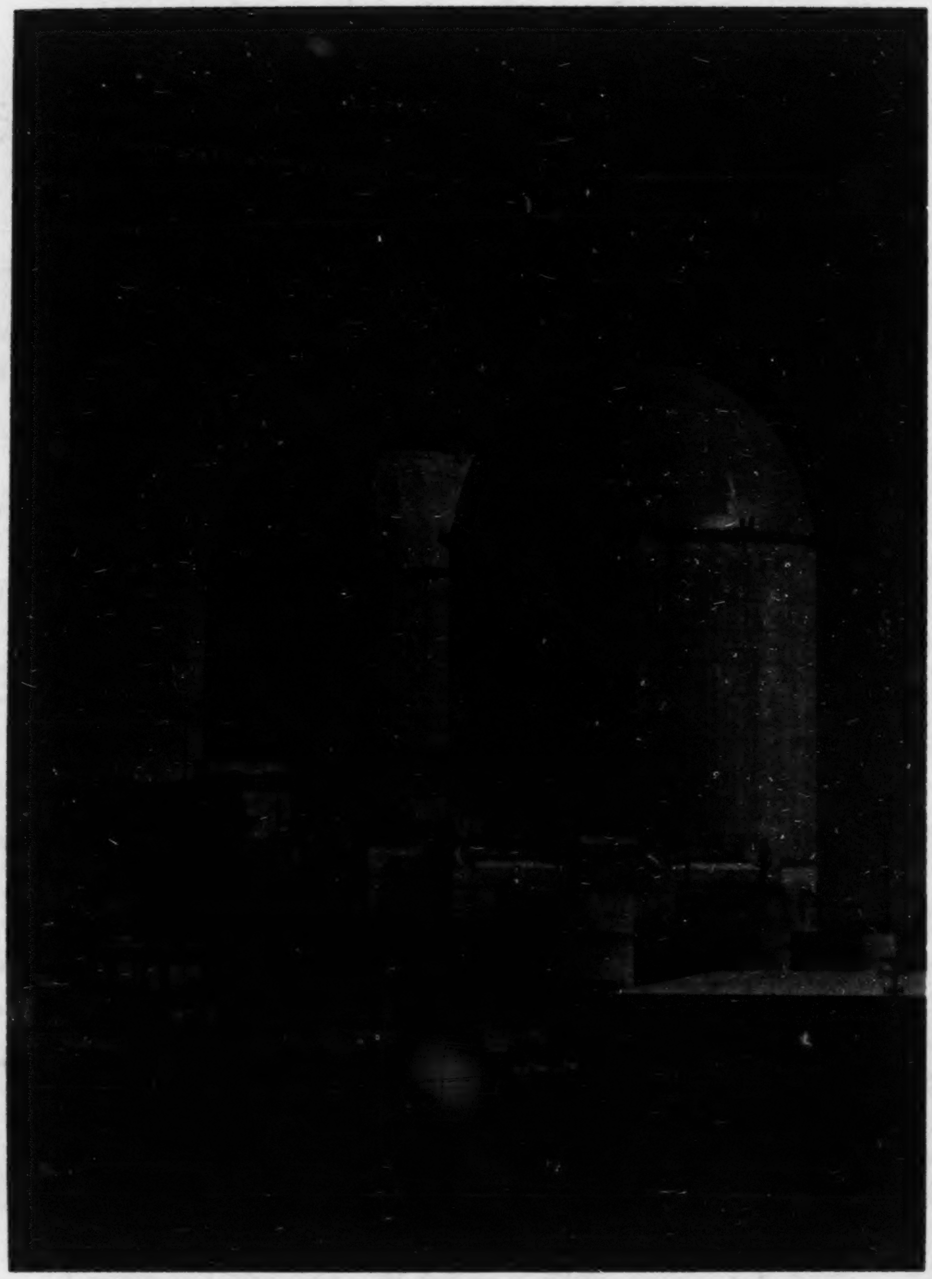
INPO developed additional Good Practices in 1983. Drawn from a variety of sources, these documents define good methods of meeting performance objectives and criteria.

Good Practices are now available in these areas: organization and administration, operations, maintenance, technical support, training and education, radiological protection, chemistry and emergency preparedness.

Normally, the documents first become available as "preliminary" documents. Thirty-six are available currently in this form. Then, after they are reviewed and refined, they are issued as formal INPO documents.

Workshops tackle key issues

Another form of assistance is the INPO workshop. In 1983, INPO conducted 14 of them. Each workshop focused on specific issues, including emergency operating experience, valves and valve motor operators, chemistry and simulator training. Some workshops concentrated on management issues, such as the Technical Support Managers Workshop in March and the Plant Managers Workshop in May.



Sharing Industry Expertise at Comanche Peak

Starting up a nuclear power plant is not a solitary process. It is a matter of sharing expertise, of borrowing ideas.

That has been the philosophy at Comanche Peak Steam Electric Station, where the staff is getting ready to bring the plant on line. Comanche Peak is Texas Utilities Electric Company's first nuclear plant, and it is nearing the final stages of completion. Looking industrywide, the plant staff is drawing on the experience of those who have been through the same process.

Comanche Peak's staff has visited other plants and has asked for other points of view. Part of that effort has involved INPO assistance programs. Studying the plant's plans for start-up, an INPO team first visited Comanche Peak in August 1982. (This was a near-term operating license, or NTOL, assistance visit.) Among the areas reviewed by the team were operations procedures, maintenance, surveillance testing, training, radiological protection and water chemistry.

"I would be less than truthful if I didn't say we were a little apprehensive of that first visit," says Dick Jones, Comanche Peak's manager of plant operations.

Jones was accustomed to the tension among his staff during frequent audits and appraisals. But the tension eased, Jones continues. "The guys from INPO were kind of like the way you'd like your doctor to be. They listened a lot. They didn't just come in and slam dunk it, so to speak. They eased into it; they built their case; they took their time."

The plant management was interested enough in the team members' comments to ask for more visits. INPO obliged, providing special assistance visits in instrument and control, radiological protection and chemistry.

An I&C special visit

Instrument and Control (I&C) Engineer Bill Taylor had some legitimate concerns about his program. Was procedural development sound? Was staffing sufficient? And did the staff have enough space to work?

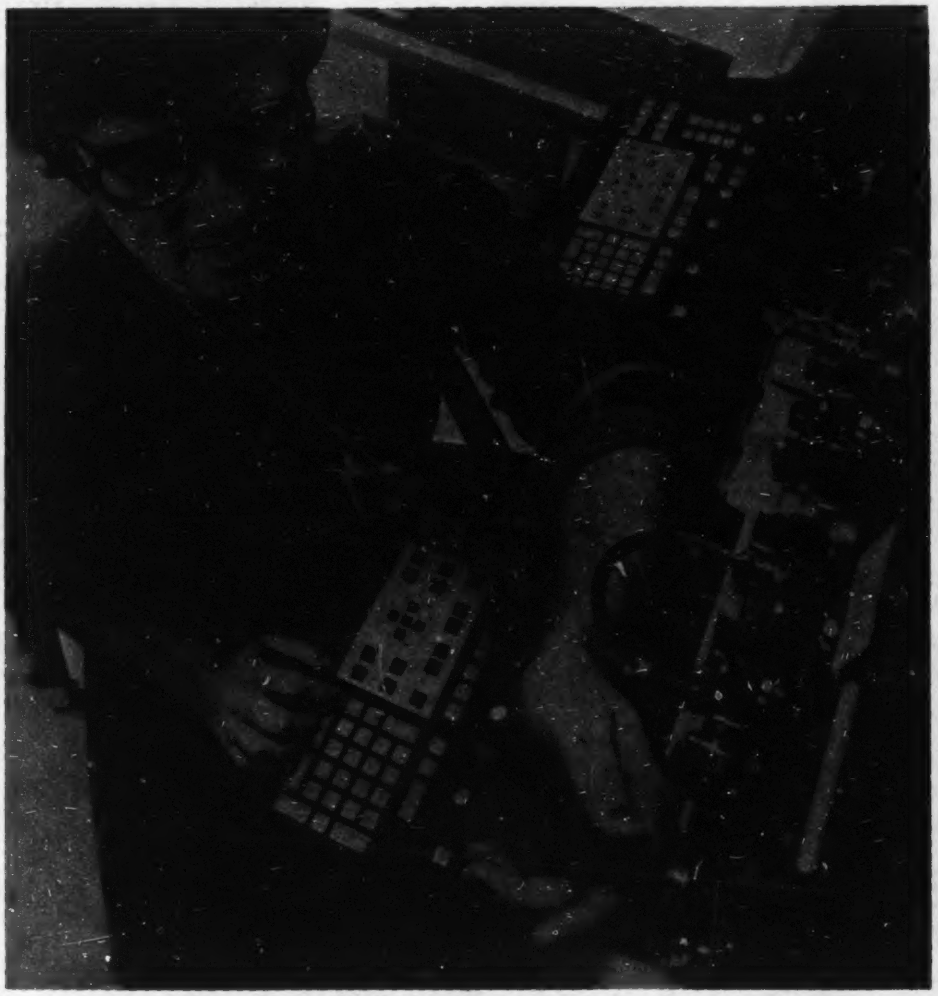
At the plant management's request, an INPO loanee from Georgia Power Company visited Comanche Peak to address those questions with Taylor. With experience in I&C programs at Georgia Power's Plant Hatch when that plant was coming on line, the loanee was familiar with the issues Taylor was raising.

Together, Taylor and the loanee studied such issues as calibration procedures, training, the use of vendor manuals and staffing projections.

Dick Jones

Bill Taylor

Sharing Industry Expertise at Comanche Peak



In particular, the two men discussed the use of vendor manuals. "Vendor manuals have a purpose," says Taylor. "In actual practice, it's necessary to rely on them in certain areas."

Taking the INPO loanee's advice, Taylor and his staff decided to use the manuals to perform some tasks. "The vendor manuals are for troubleshooting, for repairs, for actual work in the field," explains Taylor, "but the bottom line is that we have to go back and calibrate the instrument by our own plant's approved procedures."

Taylor and the loanee went on to study the I&C training program, and they looked at the need for more shop space and more supervisors. Commenting on the I&C plan for more supervisors, Taylor notes that an unbiased opinion from INPO helped sell the plan. "It made the transition smoother than it would have been had I attempted to implement it alone."

Targeting water chemistry

An unbiased opinion serves other purposes, as well. Chemistry training was one area in which it played a part. "The INPO guy came in and looked at how our technicians were running our tests, and by asking questions, he could see the technicians really needed more theory training," Chemistry and Environmental Engineer Bob Delano explains. This is one way to confirm the management decision to provide special training for just that.

An INPO team member observed training when he visited the plant to look only at the water chemistry program. The special visit also included studies of quality control, procedure development, instrumentation—areas needed to bring the chemistry program up to speed.

The team member suggested, for example, that the writing of counting room procedures should be expedited.

When INPO visited the plant, the counting room equipment was already there, including the multichannel analyzers and liquid scintillation counter needed to perform the analyses. But installing that equipment and writing the procedures lay ahead.

For Delano's part, setting up a good counting room meant borrowing ideas from other plants. Drawing from what he'd seen elsewhere, the INPO team member supplied Delano with information on model programs. Delano borrowed procedures and advice from those programs and set out to accelerate the counting room development.

Bob Delano

Since the special visit, Delano says, appraisals of the counting room have indicated notable progress. "It's one area we really beefed up quick. We've got everything calibrated. It's set up, and the only thing we lack now are some confirmatory measures. We could set our counting room down in the middle of an operating plant today and do just fine."

During the visit, Delano notes, programs were in transition. Supervisors, for example, were so involved with program development at the time of the visit that they weren't supplying their technicians with the necessary technical guidance. Delano agreed with the INPO team member that this was a valid concern. But now that programs are falling into place, he stresses, the supervisors can spend the time they need with the technicians.

Says Delano, "Now I feel pretty good about calling those guys at INPO and saying, 'Remember when you were suggesting this? Here's what we're doing. What do you think?'"

Establishing calibration procedures for the multichannel analyzer has been part of the effort to prepare the Comanche Peak chemistry program for plant operations.

Bob Lancaster

Dry-run training at work

In radiological protection, guidance for technicians comes through an extensive training program for those workers. "Our radiation protection technicians are going through the training process from step A to step Z," says Bob Lancaster, Comanche Peak radiation protection engineer. Training was one of many key topics discussed with INPO team members when they visited the plant.

Lancaster has put some of the training recommendations into practice. An objective of Comanche Peak's training program for radiological protection is to mock up the conditions of an operating plant, he explains.

"A lot of our maintenance personnel have never worked in an environment with radioactive material," he says. "So we're setting up dry-run training in which they can get a better idea of what it's like to do a valve job or any repair job with two layers of protective clothing and a respirator on their backs."

In addition, the training program requires that the radiation protection technicians handle all paperwork now, just as it will be handled in the operating plant. This gives the technicians experience in filling out radiation work permits, and it also puts them through the motions of checking a worker's history to verify proper training. "This also will test the technicians and show them what to expect," Lancaster says.

Apart from training, INPO team members visiting the plant offered tips for setting up the complete radiological protection program, covering topics from equipment maintenance to dosimetry calibration and plant surveys. Lancaster noted that, in particular, he picked up some good advice on storage areas for contaminated tools, as well as sound tips on the limits for tool contamination.

Lancaster says the team members offered helpful comments. "We weighed ideas, we evaluated and we made some changes," he says of the discussion with the team members. "I think we improved our program."

That effort, Lancaster admits, was sometimes uncomfortable. And he adds that honest critiques of his programs are not always pleasant to hear. "But my attitude was that regardless of how much it might hurt, I was going to appreciate what I heard, and I did," he says.

Like his colleagues at Comanche Peak, Lancaster's drive to improve programs for start-up includes a lot of talking, listening and critiquing. And that is not a solitary process.

Training gives workers at Comanche Peak experience under simulated radiological conditions before the plant goes into operation.

Highlights of the International and Supplier Participant Programs

The Institute's International and Supplier Participant programs were organized into a single INPO division in 1983, a move that reflects the continued growth and importance of these two key INPO programs.

Complementing its domestic utility membership, INPO has international participants from 13 other countries and an equal number of supplier participants. The international participants consist of non-U.S. nuclear utilities and utility organizations. Collectively, they represent a majority of the world's operating electric power generating reactors. The supplier participants are comprised of nuclear steam supply system vendors and major architect/engineering and constructor firms. They are the nuclear industry's principal vendors.

Participants add expertise

Participation in INPO was expanded in 1983 with the addition of three organizations. Korea Electric Power Corporation became an international participant in February, while Framatome, a major French supplier, became the Institute's first international supplier participant in June. Also joining the list of suppliers in June was the Philadelphia-based firm of United Engineers & Constructors.

To promote safe and reliable nuclear plant operation worldwide, INPO stepped up its interaction with participants in several important ways in 1983.

An International Participant Advisory Committee (IPAC) was created to assist INPO in providing a high quality international program. The IPAC, which met for the first time in April and again in November, supports close involvement between INPO top management and senior executives from the international participants.

Leaders elected for groups

The first chairman of the IPAC is Andre Gauvenet, inspector general of Electricité de France. Vice chairmen are Thomas Eckered, director of the Nuclear Safety Board of the Swedish Utilities, and J.H. Chen, vice president, Taiwan Power Company.

The IPAC provides INPO management with important feedback, constructive criticism and recommendations, including the applicability of INPO products to non-U.S. participants.

Equally noteworthy were the meetings held by the Supplier Participant Advisory Committee (SPAC). Chaired by Walter Sullivan, vice president of Stone & Webster Engineering Corporation, the SPAC met three times in 1983. It provides INPO with the views of nuclear industry suppliers and complements the Institute's in-house technical capability. At the November SPAC meeting, Dr. E. Allen Womack, a vice president of Babcock & Wilcox Co., succeeded to the chairmanship.

A separate meeting of all International Program participant points of contact (POC) was held in October. The purposes were to improve operation information exchange and to ensure that INPO's current programs are meeting the needs of the participants.

Program to witness change

A major change in the International Program was announced during the POC meeting. Beginning in 1984, the International Program no longer will be administered jointly with the Nuclear Safety Analysis Center (NSAC) of the Electric Power Research Institute. Instead, NSAC will offer an "associates" program that will be separate from the INPO International Participant Program.

One of the most visible ways that participants support the work of the Institute is by providing experienced engineers for the INPO staff. At the end of 1983, supplier participants had 21 loaned employees working at INPO, and seven liaison engineers were assigned to the Institute by international participants.

Loanees provide assistance

Supplier loanees are playing a major role in helping to establish the Institute's construction project evaluation efforts. Liaison engineers are working toward improving a two-way exchange of operating experience information between INPO and non-U.S. utilities. They also are contributing their professional experience to INPO programs.

Throughout 1983, there was interaction between participant personnel and INPO staff on many levels. There were a number of productive technical exchange visits to plants in Sweden, France and Belgium. INPO also sent special assistance teams to Spain, Mexico, Brazil, Taiwan and Korea in 1983. Representatives of participant utilities and suppliers shared their views on technical issues during INPO workshops, meetings and seminars.

Year brings expansion

In short, 1983 was a year in which both international and supplier participants became more involved with INPO and worked to promote the exchange of information.

Several international participant utilities are considering implementing their own plant evaluation programs after observing the INPO evaluation process. In 1983, Japanese utilities established the Nuclear Information Center to collect, analyze and distribute operating experience among Japanese plants and with INPO. The center is managed by the Central Research Institute of Electric Power Industry, INPO's participant in Japan.

Supplier participants are striving to make better use of construction evaluation results and plant reliability data. This information is important for plant modifications and for ongoing and future plant design efforts. The quality of plant design and construction is a key factor in the safety and reliability of nuclear power plant operations.

A Look Ahead

In this annual report, the four program areas set forth in INPO's Institutional Plan—along with highlights of the International and Supplier Participant programs—have been described. These programs, now well in place, assist the nuclear utility industry in advancing excellence.

This report has emphasized results. In the months ahead, INPO will use results achieved to assess the effectiveness of its programs in assisting members.

For example, how members are using nuclear plant reliability data system data will be scrutinized closely. This will tell whether or not the design of the program and the refinements that have been made are appropriate.

Improved communication among members, participants and INPO also will be emphasized. Such communication is vital.

Also, the follow-up of evaluation findings and responses will be more rigorous. Utility responses will be reviewed to see that they address root causes rather than symptoms.

As some missions are completed and goals are reached, energies will be channeled to other areas. For example, job and task analysis is meeting its objectives. The Institute, therefore, can devote more time and resources to accreditation and training assistance.

As INPO's programs mature and as more results are shown, even higher levels of participation and responsiveness from members are anticipated. Also, as the industry's commitment continues, excellence in nuclear plant construction and operation will lead to improved safety and reliability.

Financial Report

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Statements of Assets and Liabilities

December 31, 1983 and 1982

	1983	1982
ASSETS:		
Current assets:		
Cash	$ 484,331	$ 21,573
Short-term marketable securities (Note 2)	18,108,983	20,081,792
Accrued interest receivable	418,827	245,327
Other receivables	232,313	204,268
Deposits and prepaid expenses (Note 6)	635,112	966,859
Total current assets	19,879,566	21,519,819
Equipment and leasehold improvements	5,712,700	4,662,637
Accumulated depreciation and amortization	(1,511,774)	(514,748)
Net	4,200,926	4,147,889
Total assets	$24,080,492	$25,667,708
LIABILITIES:		
Current liabilities:		
Unearned revenue (Note 1)	$ 4,672,754	$ 6,667,203
Accounts payable	1,659,314	1,629,228
Accrued liabilities (Note 6)	1,626,572	1,921,123
Accrued employee benefits	280,376	188,827
Total current liabilities	8,239,016	10,406,381
Other accrued liabilities (Note 3)	840,000	750,000
Commitments and contingencies (Note 3)		
Accumulated revenues in excess of expenses ($4,000,000 designated for contingency reserve by Board of Directors)	15,001,476	14,511,327
Total liabilities	$24,080,492	$25,667,708

The accompanying notes are an integral part of these statements.

Statements of Revenues and Expenses

for the years ended December 31, 1983 and 1982

REVENUES:	1983	1982
Member assessments	$24,348,499	$25,229,972
Interest income	2,566,594	2,835,098
Other income	2,990,000	2,400,616
Total revenues	29,905,093	30,465,686
EXPENSES:		
Salaries and benefits	16,379,760	12,293,659
Travel, relocation and recruiting	3,974,657	3,118,030
Outside services	4,651,627	4,064,388
General and administrative	4,408,900	4,731,737
Total expenses	29,414,944	24,207,814
Excess of revenues over expenses	490,149	6,257,872
Accumulated revenues in excess of expenses at beginning of year	14,511,327	8,253,455
Accumulated revenues in excess of expenses at end of year	$15,001,476	$14,511,327

Statements of Changes in Financial Position

for the years ended December 31, 1983 and 1982

SOURCE OF FUNDS:	1983	1982
Excess of revenues over expenses	$ 490,149	$6,257,872
Add noncash expenses –		
Depreciation and amortization	997,026	571,523
Provided by operations	1,487,175	6,829,395
Increase in other accrued liabilities	90,000	750,000
Total provided	1,577,175	7,579,395
DISPOSITION OF FUNDS:		
Equipment and leasehold improvement additions	1,050,063	3,492,535
Increase in working capital	$ 527,112	$4,086,860
INCREASE IN WORKING CAPITAL:		
Increase (decrease) in current assets –		
Cash	$ 462,758	$ (76,468)
Short-term marketable securities	(1,972,809)	9,904,995
Accrued interest receivable	173,500	(199,278)
Other receivables	28,045	1,506
Deposits and prepaid expenses	(331,747)	216,415
Decrease (increase) in current liabilities –		
Unearned revenue	1,994,449	(4,755,753)
Accounts payable	(30,086)	(849,785)
Accrued liabilities	294,551	(79,905)
Accrued employee benefits	(91,549)	(74,867)
Increase in working capital	$ 527,112	$4,086,860

The accompanying notes are an integral part of these statements.

Notes To Financial Statements

NOTE 1 - Description of organization and summary of significant accounting policies:

The Institute of Nuclear Power Operations Inc. (INPO), incorporated in October 1979, was established by the electric utility industry to assist utilities in ensuring safe operation of nuclear power plants.

Basis of accounting –

INPO employs the accrual basis of accounting and, accordingly, records member contributions as revenues in the year to which they apply and records interest income as it is earned.

The costs of equipment and leasehold improvements are depreciated on a straight-line basis over five years, estimated to be the useful life of the property. Expenditures for leasehold improvements and equipment are capitalized when the individual asset cost exceeds $10,000.

NOTE 2 - Short-term marketable securities:

Short-term marketable securities, stated at cost that approximates market, are comprised of the following:

	December 31	
	1983	1982
Commercial paper, average interest rate of 10.2% and 9.5% respectively.	**$ 4,481,000**	$ 9,700,000
Certificates of Deposit, average interest rate of 9.1% and 8.0% respectively.	**1,000,000**	1,500,000
Governmental agencies, average interest rate of 9.9% and 10.7% respectively.	**12,627,983**	8,881,792
	$18,108,983	$20,081,792

NOTE 3 - Commitments and contingencies:

Leases –

INPO has entered into operating lease agreements for office facilities. Rental expense under these leases was $938,000 in 1983 and $1,640,000 in 1982. In December 1981, INPO entered into a lease agreement for new office space, which was occupied in October 1982. In connection with the move to the new office space, the Company negotiated a deferred payout arrangement for the lease on the prior office space, which was vacated. The present value of future payments for the prior office space, discounted at 12%, totaled $840,000 and $750,000 at December 31, 1983 and 1982, respectively and is reflected as a noncurrent accrued liability in the statements of assets and liabilities. The costs associated with this liability, $90,000 in 1983 and $750,000 in 1982, were charged to general and administrative expenses in the accompanying statements of revenues and expenses.

Future minimum lease payments under noncancelable leases, substantially all for office space, were as follows at December 31, 1983:

	Operating Leases
1984	$ 1,693,000
1985	1,773,000
1986	1,845,000
1987	1,919,000
1988	2,191,000
Thereafter	9,345,000
	$18,766,000

Other Commitments –

As of December 31, 1983, INPO has commitments to purchase fixed assets and utilize consulting services totaling $1,752,000.

Guarantees –

As part of its relocation policy, INPO guarantees short-term loans up to the estimated amount of equity in the employee's former residence, provided that the loan is applied to the purchase of a primary residence in the metropolitan Atlanta area. Additionally, INPO has guaranteed second mortgages for certain employees hired before the relocation plan was expanded (Note 6). The contingent liability on all such loans at December 31, 1983, amounted to approximately $62,000.

NOTE 4 - Tax status:

INPO has been granted tax-exempt status under Section 501(c)(3) of the Internal Revenue Code as an organization that lessens the burdens of government whereby only unrelated business income, as defined by the Code, is subject to federal income taxes.

NOTE 5 - Pension plan:

INPO has a noncontributory, defined benefit pension plan for its employees. INPO's policy is to fund each year's accrued cost under the plan. Pension expense amounted to $621,736 and $502,936 for the periods ended December 31, 1983 and 1982, respectively. However, certain changes in actuarial assumptions were adopted during 1983 to determine the pension cost for that year. These changes are summarized as follows:

- change in interest rate from 6% to 7%
- change in mortality table from the 1971 Towers, Perrin, Forster and Crosby Forecast Mortality Table to the UP-1984 Unisex Mortality Table
- change in Social Security projections from 3% to 3.5% for CPI and 5% to 5.5% for wage base
- change in salary scale from 5.5% to 6%
- change in turnover decrements and disability scale

The changes resulted in the 1983 pension expense being approximately $94,000 less than if the prior year's assumptions had been used.

As of January 1, 1983 and 1982, there was no actuarial present value of vested plan benefits. Using a 9% rate of return for both years, the present value of total accrued benefits was $243,450 and $105,610 in 1983 and 1982, respectively. Similarly, the total market value of the plan's assets as of January 1, 1983 and 1982 was $1,207,147 and $520,977, respectively.

NOTE 6 - Relocation agreement:

In July 1981, INPO entered into an agreement with Chemical Bank Executive Relocation Services to purchase the homes of relocating INPO employees. Under the terms of the agreement, INPO is directly liable for $431,000 of purchased equity in these homes as of December 31, 1983. Purchased equity is recorded as deposits and prepaid expenses until each home is sold by the relocation service. INPO borrows the equity and records the payable in accrued liabilities.

Auditors' Report

To the Board of Directors
of the Institute of Nuclear Power Operations Inc.:

We have examined the statements of assets and liabilities of the Institute of Nuclear Power Operations, Inc. (a Delaware corporation, not for profit) as of December 31, 1983 and 1982, and the related statements of revenues and expenses and changes in financial position for the periods then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the financial statements referred to above present fairly the assets and liabilities of the Institute of Nuclear Power Operations, Inc., as of December 31, 1983 and 1982, and its revenues and expenses and the changes in financial position for the periods then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Atlanta, Georgia
January 17, 1984

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December 3, 1984

Hon. Frank Annunzio, Chairman
Joint Committee on Printing
818 Hart Senate Office Building
Washington, D.C. 20510

Dear Frank:

Earlier this year the Subcommittee on Energy Research and Production held a hearing on the lessons learned in utility management and the status of the federally-funded research and development activities being conducted in conjunction with the cleanup now underway at the damaged Three Mile Island Nuclear Power Station. During the hearing, the witness from the Nuclear Regulatory Commission offered to provide the Subcommittee with an internal staff report which had been prepared for the Commissioners and which addressed a number of issues of vital interest to this Subcommittee.

This material has been reviewed by our staff and they have concluded that the material is of direct relevance to the issues addressed in the hearing record and that it is information not generally available to either the Congress or the public at large.

Therefore, I would request that permission be granted to include this material, in its entirety, in our hearing record notwithstanding the fact that it has been printed by the NRC as an internal staff document of the Commission. It is our intention to use this document, which is 190 pages, as camera copy. If there are any questions concerning this request, I would suggest that your staff contact Mr. David Clement at 225-8152.

Sincerely,

Marilyn
MARILYN LLOYD, Chairman
Subcommittee on Energy
Research and Production

ML:Cdm

NUREG-0680
Supp. No. 5

TMI-1 Restart

An Evaluation of the Licensee's Management Integrity as It Affects Restart of Three Mile Island Nuclear Station Unit 1 Docket 50-289

Manuscript Completed: July 1984
Date Published: July 1984

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ABSTRACT

Supplement 5 to the Safety Evaluation Report (SER) on TMI-1 Restart documents the review by the Nuclear Regulatory Commission (NRC) staff of nine investigations conducted by the NRC Office of Investigations into matters identified as relevant and material to an evaluation of the licensee's "management integrity." The staff has included, as part of its evaluation, materials from its review of the GPU v. B&W lawsuit record (NUREG-1020LD, "GPU v. B&W Lawsuit Review and Its Effect on TMI-1") as well as other relevant materials developed since the close of the record in the TMI-1 Restart proceeding. In developing its position on General Public Utilities Nuclear Corporation's character (i.e., management integrity), the staff evaluated matters that cast doubt on the licensee's character, individually and collectively; considered the remedial actions taken by the licensee; and balanced past improper conduct of the licensee against its subsequent record of remedial actions and performance and record of current senior management of the licensee. The staff concluded that, while the past improper conduct was grave, the remedial actions taken, the subsequent record of performance, and the record of current senior management support a finding that GPUN can and will operate TMI-1 without undue risk to the health and safety of the public.

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ACKNOWLEDGMENTS

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ACRONYMS AND INITIALISMS

ACRS	Advisory Committee on Reactor Safeguards
AEC	Atomic Energy Commission
AO	auxiliary operator
ASLAB	Atomic Safety and Licensing Appeal Board
ASLB	Atomic Safety and Licensing Board
ATOG	Abnormal Transient Operating Guidelines
B&W	Babcock & Wilcox Company
Bechtel	Bechtel North American Power Corporation
BETA	Basic Energy Technology Associates, Inc.
BN	Board Notification
BOP	balance of plant
CLI	Commission Legal Issuance
CRO	control room operator
DOJ	Department of Justice, U.S.
DOL	Department of Labor, U.S.
dpm	decades per minute
ECP	estimated critical position
EDO	Executive Director of Operations, NRC
EFW	emergency feedwater
EI	Energy Incorporated
ELD	Office of the Executive Legal Director, NRC
FSAR	Final Safety Analysis Report
FSR	Fundamentals and System Review (Program)
GET	general employee training
GPU	General Public Utilities Corporation
GPUN	General Public Utilities Nuclear Corporation
GPUSC	General Public Utilities Service Corporation
HPI	high-pressure injection
HVAC	heating, ventilating, and air conditioning
I&C	instrumentation and control
IE	Office of Inspection and Enforcement, NRC
Met-Ed	Metropolitan-Edison Company
MUT	makeup tank
NGS	nuclear generating station
NOV	Notice of Violation
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation, NRC

OGC	Office of General Counsel, NRC
OLB	Operator Licensing Branch, NRC
OI	Office of Investigations, NRC
PID	Partial Initial Decision
POD	plan of the day
PORC	Plant Operations Review Committee
PORV	pilot-operated relief valve
RCDT	reactor coolant drain tank
RCS	reactor coolant system
RHR	Rohrer, Hibler and Reployle, Inc.
RO	reactor operator
SALP	Systematic Assessment of Licensee Performance
SECY	Office of the Secretary of the Commission, NRC
SER	Safety Evaluation Report
SO	Site Operations
SOE	sequence of events
SRO	senior reactor operator
TDR	technical data report
TMIA	Three Mile Island Alert (a restart intervenor)
TMI-1	Three Mile Island Unit 1
TMI-2	Three Mile Island Unit 2
TS	Technical Specification(s)
TWG	Test Working Group
UE&C	United Engineering and Constructors
UWI	unit work instruction

1.0 INTRODUCTION

When the Three Mile Island Unit 2 (TMI-2) accident occurred on March 28, 1979, the other nuclear power plant at the site, Three Mile Island Unit 1 (TMI-1), was in a power ascension mode after completion of a refueling outage. TMI-1 was immediately shut down by the licensee, Metropolitan-Edison Company (Met-Ed). TMI-1 has not been restarted.

The Nuclear Regulatory Commission (NRC) issued several orders after the accident, requiring the licensee to complete a number of actions before the restart of TMI-1 would be permitted. The Commission also decided that a public hearing should be held concerning the restart of TMI-1. A number of specific issues were identified by the Commission for resolution through the hearing process. *See* Commission Legal Issuance CLI-79-8, 10 NRC 141 (1979); CLI-80-5, 11 NRC 408 (1980).

On April 18, 1983, the staff informed the Commission that as a result of several developments that might bear on the competence and integrity of TMI management the staff was initiating actions to revalidate its position on the management integrity issue. In the course of that revalidation, a number of additional matters have arisen that also might bear on the competence and integrity of TMI management. All of these matters are described in Section 3.0, "Background," of this report.

The staff stated in a July 15, 1983, memorandum from the Executive Director for Operations (EDO) to the Commission that when the reviews and investigations related to integrity were complete, the staff would integrate them into an overall position on management integrity. It is the purpose of this report, Supplement No. 5 to the TMI-1 Restart Safety Evaluation Report (NUREG-0680), to provide the staff's overall position on licensee's management integrity and to document the bases for that position.

A summary of the staff's conclusions is presented in the following section (Section 2.0). The background of the management integrity issue in the TMI-1 restart proceeding is then provided. The background section (Section 3.0) includes a discussion of the basis for an examination of management integrity, the evolution of the integrity issue in the restart proceeding, and the organization of this report. The results of the staff's assessment* of the various matters bearing on the integrity of licensee's management are presented in Sections 4.0 through 11.0. Section 12.0 discusses the legal standards by which "management integrity" is to be judged. Finally in Section 13.0, the staff provides its overall assessment of licensee's management integrity based on the results discussed in Sections 4.0 through 11.0 and the legal standards discussed in Section 12.0.

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*The staff's enforcement review is being conducted separately from its licensing review; however, these reviews are being internally coordinated.

Each of the principal subjects of investigation is addressed separately in Sections 4.0 through 11.0.

Table 1.1 identifies the principal issues evaluated in this report. Table 1.2 lists the integrity issues contained in the Commission's January 20, 1984, memorandum (numbering the issues as the Commission did) and identifies the section in which the particular issue is addressed.

Table 1.1 Principal issues addressed in this report

Section	Issue
4.0	TMI-1 Leak Rate Falsification
5.0	Hartman Allegations and Related Safety Concerns
6.0	BETA/RHR Reports
7.0	Training (Cheating and Recertification Irregularities)
8.0	Keaten Report
9.0	Lucien Report
10.0	Alleged Harrassment of Parks, King, and Gischel
11.0	Change of Operator Testimony

Table 1.2 Location in this report of the integrity issues contained in the Commission's January 20, 1984, Memorandum*

Integrity Issue	Subject	Discussion
I.A.1-I.A.4	Information Flow	Resolved
I.B.1-I.B.5	Current Training Program	Resolved
I.B.6	Preaccident Training Program	Section 7.0
I.B.7	Current Training Program	Resolved
I.C.1-I.C.6	Activities Endangering Public Health and Safety	Resolved
I.D.1-I.D.2	Financial/Technical Interface	Section 8.0
I.E.1	Dieckamp Mailgram	Resolved
I.F.1	Hartman Allegations	Section 5.0
II.A.1-II.A.6	Management Response to Cheating	Resolved
II.B.1-II.B.3	Management Knowledge/Involvement in Cheating	Resolved
II.C.1-II.C.3	Extent of Cheating	Resolved
II.D.1-II.D.2	Training and Testing Program	Resolved
II.E.1	System for Certifying Candidates	Resolved
II.E.2-II.E.3	False Certification of Floyd	Section 7.0
III.A.1-III.A.5	TMI-2 Leak Rate Issue	Section 5.0
III.B.1-III.B.3	TMI-1 Leak Rate Issue	Section 4.0
III.C.1-III.C.3	Alleged Harassment of Parks, King, and Gischel	Section 10.0
III.D.1	Timely Reporting of Documents	Sections 5.0, 6.0, and 8.0
III.E.1-III.E.2	Keaten Report	Section 8.0
III.F.1-III.F.2	Operator Testimony	Section 11.0
III.F.3	Preaccident Reduction in Training	Section 7.0
III.F.4	Recognition of Preaccident Deficiencies	Section 8.0
III.F.5	Arnold's Testimony Before ASLB	Resolved
III.F.6	Condensate Polisher Bypass	Section 8.0
III.G.1-III.G.2	Boring Brothers Allegations	Resolved
III.H.1	Unattended Examinations and Answer Keys	Resolved
III.I.1	Psychological Testing Allegations	Resolved
III.J.1	Implementation of Long-Term Items	Resolved
III.J.2	Procedural Violations	Resolved

*In "NRC Staff's Comments on the Commission's January 20, 1984, List of Integrity Issues in Restart Proceeding," dated February 21, 1984, the staff expressed its view that a number of the issues identified by the Commission were resolved and identified the basis for such a view. Where an issue identified by the Commission is, in the staff's view, resolved as explained in the February 21, 1984, filing, the notation "Resolved" appears in this table.

2.0 SUMMARY AND CONCLUSIONS

The staff has reviewed the results of several investigations conducted by the NRC Office of Investigation (OI) and other materials previously identified as relevant and material to an evaluation of the licensee's "management integrity." The staff's conclusions from its review of the information within each subject area may be summarized as follows:

Section 4.0, TMI-1 LEAK RATE FALSIFICATION - The staff concludes that the evidence does not support a finding that leak rate surveillance tests were intentionally or systematically falsified nor was there a motive to do so at TMI-1 during the period investigated.

Section 5.0, HARTMAN ALLEGATIONS AND RELATED SAFETY CONCERNS - The staff finds that falsification of TMI-2 leak rate tests occurred and that negligence on the part of management created, in part, the circumstances that resulted in leak rate falsification. The staff also finds that the licensee failed to make a timely Board notification concerning the Faegre & Benson Report on the Hartman allegations and concerning certain depositions by Hartman.

Section 6.0, BETA/RHR REPORTS - The staff believes the licensee can be considered to have failed to meet its duty to make Board notifications and its obligation under Section 186 of the Atomic Energy Act by failing to provide the BETA and RHR Reports in a more timely fashion.

Section 7.0, TRAINING - The staff finds that training program deficiencies existed before the accident that were indicative of either a poor attitude on the part of management or a careless disregard of management responsibilities. Cheating on postaccident requalification examinations and irregularities in the certification for requalification of a management-level individual also raises questions about management's attitude and performance.

Section 8.0, KEATEN REPORT - The staff concludes that the process of review of the drafts of the Keaten Report by management did not result in a final product that was improperly influenced so as to reflect better on the licensee than would otherwise have been the case. On the basis of information related to the Keaten Report, however, the staff further concludes that statements were made by the licensee in its December 5, 1979, response to the October 25, 1979, Notice of Violation that were neither accurate nor complete and that were contrary to other information in the possession of the licensee.

Section 9.0, CHANGES TO THE LUCIEN REPORT - The staff finds that the circumstances under which changes were made to the report by K. Lucien of Energy Incorporated on the condensate/polisher system do not raise questions concerning the integrity of the licensee or its personnel.

Section 10.0, PARKS, KING, GISCHEL - The staff concludes that R. Parks was harassed by management officials of Bechtel with the knowledge of GPUN. The staff concludes that there was no harassment, intimidation, or retaliation directed at L. King or E. Gischel.

Section 11.0, CHANGE OF OPERATOR TESTIMONY - The staff finds that GPUN was not involved in improper activities with respect to any coercion of E. Frederick, C. Faust, or W. Zewe to change their testimony concerning an actuation of high-pressure injection (HPI) at 0541 on the day of the TMI-2 accident. The staff also finds that GPUN was under no obligation to report its change in position during the GPU v. B&W trial on 0541 HPI actuation.

The staff has also evaluated these matters collectively in revalidating a staff position on whether GPUN's character (i.e., management integrity) provides reasonable assurance that the licensee can and will adequately protect public health and safety. The improper activities of the licensee have been evaluated in conjunction with the licensee's remedial actions and subsequent performance. The pattern of activity by Met-Ed, had it been known by the staff at the time the staff formulated its position on management in the restart proceeding, would likely have resulted in a conclusion by the staff that Met-Ed had not met the standard of reasonable assurance of no undue risk to the public health and safety. However, the staff reaches a different conclusion with respect to the present licensee organization. Based on all the information reviewed by the staff and balancing the past improper activities of the licensee against its subsequent record of remedial actions and performance, as well as the record of current senior management of the licensee, the staff concludes that there is reasonable assurance that GPUN can and will conduct its licensed activities in accordance with regulatory requirements and that GPUN can and will operate TMI-1 without undue risk to the health and safety of the public. The staff, therefore, revalidates its position on licensee's management integrity.

The staff also has evaluated the "managerial integrity" of several current GPU/GPUN officials and determined there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with these particular individuals in positions related to those responsibilities. The staff reaches no conclusion at this time on the managerial integrity of individuals who no longer hold management positions with GPU/GPUN. It is the staff's position, and an essential part of the staff's ability to revalidate its position on licensee's management integrity, that GPUN must obtain staff review and approval on a case-by-case basis before the assignment of any of several specific individuals to responsible management positions associated with supervision of operations or maintenance of GPUN's licensed nuclear facilities.

3.0 BACKGROUND

3.1 Integrity Issue in the TMI-1 Restart Proceeding

The question of management integrity was not explicitly identified by the Commission in its original Order and Notice of Hearing in the TMI-1 Restart proceeding. See CLI-79-8, 10 NRC 141 (1979). When the Atomic Safety and Licensing Board (ASLB) issued its partial initial decision (PID) on management issues, it considered the question of integrity in a number of areas and noted that management integrity was one of the "important issues considered" by the ASLB. See 14 NRC 381, 403 (1981). The question of the relationship between certain incidents of cheating on NRC operator examinations and management integrity was later explored in the reopened proceedings on cheating before the Special Master and before the ASLB. See 15 NRC 918 (1982); 16 NRC 281 (1982).

On April 18, 1983, the staff informed the Commission that the staff was initiating actions to revalidate the staff's position on the management integrity issue because of the pendency of several matters that might bear on the competence and integrity of TMI management. These matters included:

(1) the GPU v. B&W lawsuit record review

(2) the Hartman allegations concerning leak rate test falsification at TMI-2

In a May 19, 1983, memorandum to the Commission, the Executive Director for Operations (EDO) identified additional open issues relevant to management integrity. These issues included

(1) the Parks and King allegations concerning irregularities in the cleanup of TMI-2 and harassment of "whistleblowers"

(2) the staff's review of the contents of the BETA and RHR Reports to determine whether they contain any new information that is material to the resolution of the Commission's restart issues, the contentions of the parties, and the cheating issues*

(3) the effect on management integrity of the licensee's failure to promptly report the BETA and RHR Reports to the Commission and ASLAB and any other failures of the licensee to promptly notify the Commission and/or ASLAB of other relevant and material information

The staff stated in a July 15, 1983, memorandum from the EDO to the Commission that when the reviews and investigations related to these items were complete, the staff would integrate them into an overall position on management integrity.

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*The results of the staff's technical review of the BETA and RHR Reports were presented in Supplement 4 of the TMI-1 Restart Safety Evaluation Report, NUREG-0680, dated October 1983.

On September 2, 1983, the staff apprised the Commission of a new development related to the licensee's management integrity (see Board Notification BN-83-138). The staff identified irregularities in leak rate tests at TMI-1 that resulted in an investigation into this matter by the NRC Office of Investigations (OI).

In September 1983, the staff issued NUREG-1020,* which provided the results of the staff's GPU v. B&W lawsuit review. With respect to the management issues involved in the restart proceeding, the staff identified seven specific areas in which potential "management competence/integrity" issues were raised by the lawsuit documents. These areas were

(1) the Hartman allegations concerning leak rate test falsification at TMI-2

(2) the conduct of the licensee's internal investigation of the TMI-2 accident (the Keaten Report) and whether the process of review by management of the Keaten Report drafts improperly influenced that report

(3) possible irregularities in the licensee's training programs and training records before the accident

(4) possible knowledge by the licensee of defective plant conditions that may have contributed to the TMI-2 accident

(5) certain incidents of cheating on licensing and operator examinations and requalification certification irregularities

(6) questions concerning the knowledge of the licensee concerning the TMI-2 accident sequence

(7) whether financial considerations had an undue influence on TMI operation before the TMI-2 accident

Several of these matters were referred to OI for appropriate action. The staff stated again in NUREG-1020 that, when the pending actions for each of the open items had been completed, the staff would evaluate the results and integrate them into an overall position on management integrity:

> The staff's report on its overall position on management integrity will contain an evaluation of each of the issues identified as material to management integrity. In addition to considering the results of the investigations as they relate to each of these matters individually, the staff will consider whether a pattern

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*On June 20, 1984, Board Notification BN-84-121 was issued. This Board Notification identified that the limited distribution version of NUREG-1020 (identified as NUREG-1020LD) was made publicly available.

> of conduct emerges which is relevant to the staff's assessment of the licensee's management competence/integrity. The pace of OI's investigations of the several matters described above will determine when the staff's report on management competence/integrity can be issued. NUREG-1020, Section 10.10 at 10-24.

OI has completed 9 investigations relating to the issues referred to OI and has issued reports on its findings. Table 3.1 identifies all investigation reports that have been issued by OI in relation to TMI and correlates the relevant OI reports with the sections of this report where they are addressed.

3.2 Basis and Standard for the Integrity Inquiry

In its recent decision on the management phase of the TMI-1 restart proceeding, the Atomic Safety and Licensing Appeal Board (ASLAB) discussed the basis for the inquiry into the licensee's management integrity. See ALAB-772, 19 NRC ___ (May 24, 1984) (slip op. at 10-14). The ASLAB noted that what began as an inquiry into the licensee's technical capability and resources has evolved into a search for answers to questions concerning the integrity of the licensee's management as well (Id. at 10-11).

The ASLAB cited Section 182a of the Atomic Energy Act (AEA) (42 U.S.C. §2232a), together with Section 103b of the AEA (42 U.S.C. §2133b), as the basis for an inquiry into a licensee's "character" (Id. at 11). The ASLAB equated "character" and "integrity" for the purpose of this proceeding (Id. at 11-12).

The lack of any precise standards against which to measure licensee's conduct was acknowledged by the ASLAB (Id. at 14). The ASLAB noted that "[e]valuation of character always involves consideration of largely subjective factors" (Id. at 12). The NRC is not without precedents in judging character, however. The ASLAB cited several cases in which specific factors were highlighted as material to "character." See, e.g., Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), CLI-80-32, 12 NRC 281, 291 (1980) (abdication of responsibility or abdication of knowledge by an applicant could provide a basis for adverse licensing action); Consumers Power Co. (Midland Plant, Units 1 and 2), CLI-83-2, 17 NRC 69, 70 (1983) (a plan to withhold material information reflects on character); Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-106, 6 AEC 182, 184 (1973) ("managerial attitude" is relevant in evaluating whether an applicant will carry out its regulatory responsibilities).

The ASLAB also emphasized a licensee's "great responsibility to the public" and the NRC's "heavy dependence on the licensee for accurate and timely information about the facility and its operation." ALAB-772, supra (slip op. at 13-14). The ASLAB concluded as follows:

> Thus, while lacking precise standards against which to measure licensee's conduct, the foregoing views provide valuable aid for grasping the slippery concept of management competence. They serve as well as guideposts for our appellate review of the Licensing Board's decisions. Id. at 14.

Table 3.1 Reports issued by the Office of Investigation in relation to Three Mile Island

OI Case Number/Date	Subject	SER Section
1-83-028/April 16, 1984 and Supplement (same)	Possible falsification of reactor coolant system inventory leak rate tests	4.0
None/June 22, 1984	Investigative evaluation of remaining allegations relating to Harold Hartman	5.0
1-83-013/April 16, 1984	Alleged failure to provide BETA and RHR consultant reports to the NRC in a more timely fashion	6.0
Q-1-84-004/March 22, 1984 11-82-002/March 21, 1983	Possible training irregularities allegations regarding material false statements	7.0
1-83-012/May 18, 1984	Alleged improper influence by GPU upper management causing changes to be made to its internal TMI-2 accident review report	8.0
Q-1-84-006/May 18, 1984	Possible improper influence exerted on contractor to change report critical of the licensee	9.0
11-83-002/May 18, 1984 11-83-002/September 1, 1983	Allegations regarding discriminatory acts for raising safety concerns on safety-related modifications, quality assurance procedures, and the use of polar crane	10.0
1-84-005/July 13, 1984	Potential improper management influence on plant operators to change testimony	11.0
1-83-003/March 7, 1983 and Supplement October 12, 1983	Alleged compromise of pre-employment examination	None*
1-83-004/February 28, 1983	Circumstances surrounding GPUN senior management's decision not to report allegation regarding alleged testing improprieties to NRC and ASLAB	None*
1-83-015/July 13, 1984	TMI-2 alleged falsification of radiation monitoring report	None*
Q-1-83-016/July 1, 1983	Allegations concerning fire protection training deficiencies	None*

*This issue is not material to GPUN management integrity.

These same "guideposts" are being used by the staff in formulating its position on licensee's integrity. Near the beginning of the staff's review of the GPU v. B&W lawsuit record, the staff identified a number of factors from agency caselaw which appeared to be relevant and material to an evaluation of a licensee's integrity. These factors included such elements as false statements to the NRC, violations of regulatory requirements, failures to make required reports to the NRC, abdication of responsibility or knowledge, and management's attitude toward regulatory responsibilities. The staff used these factors as guidance in preparing Section 10, "Management Competence/Integrity," of NUREG-1020, "GPU v. B&W Lawsuit Reviews and Its Effect on TMI-1," September 1983.

These same factors, together with caselaw such as the ASLAB's recent ALAB-772, are relied on by the staff in formulating its overall position on licensee's management integrity in Section 13.0 of this report. Section 12.0 contains a detailed discussion of the legal standards that are applicable to an evaluation of management integrity.

3.3 Guide to the Citations Used in This Report

The report makes extensive reference to investigation reports completed by the Office of Investigations (OI) (see Table 3.1 for a complete identification of OI investigation reports). For ease of reference, each OI investigation report is cited within the text of this evaluation by the use of an abbreviated notation as follows:

Notation	OI Report Date/Case Number
OI LR-1	April 16, 1984/1-83-028
OI LR-1 Supp.	April 16, 1984/1-83-028, Supplement
OI Hartman	June 22, 1984/None
OI BETA/RHR	April 16, 1984/1-83-013
OI Training	March 22, 1984/Q-1-84-004
Not cited*	March 21, 1983/H-82-002
OI Keaten	May 18, 1984/1-83-012
OI Lucien	May 18, 1984/Q-1-84-006
OI Testimony Change	July 13, 1984/1-84-005
September 1, 1983, OI Report	September 1, 1983/H-83-002
May 18, 1984 OI Report	May 18, 1984/H-83-002

When reference is made to the OI report itself, the citation appears as the abbreviated notation for the report followed by the page or pages of the report being referenced (i.e., OI LR-1 at 3). When reference is made to one of the numbered exhibits to an OI report, the citation appears as the abbreviated notation for the report followed by the exhibit number and then the page number of the exhibit being referenced (i.e., OI Keaten Ex. 1 at 12).

Several of the OI investigations identified above were initiated as a result of the staff's review of the GPU v. B&W lawsuit record (NUREG-1020). The staff has found it necessary to make reference to lawsuit documents in this evaluation. (NUREG-1020, Volume 2, provides a complete listing and identification of all lawsuit documents.) Lawsuit documents are referenced in this evaluation in the same format as was used in NUREG-1020. An example of each type of document is provided below:

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*This report, which was referred to the Department of Justice (DOJ) for review, is, at the request of DOJ, not being released. The staff relied on other public documents in its evaluation of the subject.

Notation	Explanation
Herbein at Dep. Tr. 317	Pretrial deposition of Herbein at page 317
Zewe at Test. Tr. 2138	Trial testimony of Zewe at page 2138
B&W 351	B&W exhibit number 351
GPU 2079	GPU exhibit number 2079

4.0 TMI-1 LEAK RATE FALSIFICATION

4.1 Background

In July 1983, Region I commenced a special, unannounced inspection of reactor coolant system (RCS) leak rate test procedures, equipment, and records at TMI-1. The basic objective of the inspection was to determine if the records of RCS leak rate surveillance testing at TMI-1, for the period April 1, 1978, through March 31, 1979, showed any indications of practices similar to alleged irregularities at TMI-2. The allegations related to TMI-2 RCS leak rate testing involved the following:

(1) Tests were often repeated until the results met the acceptance criteria of the Technical Specifications (TS); the unfavorable results were discarded.

(2) RCS water inventory was adjusted during the leak test period. Contrary to procedural requirements, these water additions were neither recorded in the Control Room Operator's Log or the Shift Foreman's Log nor were they factored into the RCS leak rate test calculations.

(3) Hydrogen gas was added to the makeup tank (MUT) in such a manner as to influence leak rate test calculations in a favorable way.

(4) Computer data entries for the leak rate calculations were altered to make the leak rate test calculations appear acceptable.

OI LR-1 Ex. 1 at 5.

The results of the special inspection are documented in Inspection Report 50-289/83-20 dated September 21, 1983, and its subsequent revision dated February 24, 1984. From the 645 test records examined the revised inspection report identified 13 instances of water additions and 11 instances of hydrogen additions to the RCS MUT during the performance of RCS leak rate surveillance tests without these additions being properly accounted for in the test calculations. Additionally, 13 feed-and-bleed operations were identified as occurring during the performance of leak rate tests for which the leak rate calculations were not properly corrected for these evolutions. One instance of a combined hydrogen addition, water addition, and feed-and-bleed operation was found. These 38 instances amount to 5.9% of the surveillance tests examined. After these evolutions were considered, recalculation by the inspection team showed, with the exception of three instances, that the TS acceptance criteria would have been met even if these evolutions had not occurred.* OI LR-1 Ex. 17 at 7.

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*The revised inspection report concluded four instances would not have met TS limits; however, as discussed in Section 4.2.1.3, the test beginning at 0047 on May 12, 1978, would not have exceeded 1 gpm and, therefore, was acceptable.

On the basis of the special inspection findings, T. E. Murley, Regional Administrator, Region I, requested on September 21, 1983, that the Office of Investigations (OI) conduct an investigation into suspected falsification of RCS leak rate test data at TMI-1. Murley requested that the investigation determine if there was a systematic pattern of falsification of RCS leak rate surveillance test data by control room operators at TMI-1 and, if so, to what extent licensee's management was cognizant of and/or involved in such activity. OI LR-1 at 1, 4.

The investigation was completed by the OI Field Office, Region I, and two reports dated April 16, 1984 (Investigation Report 1-83-028), were submitted. The first report was submitted as pending; the second report (supplemental) completed all investigative leads [Memorandum from B. B. Hayes (OI) to T. E. Murley (Region I) dated April 16, 1984]. A discussion of the results of the investigation is presented below.

4.2 Investigation Results

The principal conclusions of the investigation may be summarized as follows:

(1) The percentage of questionable leak rate test results was small in comparison with the total number of leak rate tests examined (38 out of 645 or 5.9%). NRC recalculation of these tests concluded that the TS acceptance criteria would have been met, except for three tests, even if the unaccounted-for evolutions had not been made. OI LR-1 at 1.

(2) The investigation did not disclose conclusive evidence to indicate that any TMI-1 licensed operator deliberately falsified RCS leak rate surveillance test results (OI LR-1 at 2; OI LR-1 Supp. at 1-2).

(3) The investigation did not identify a systematic pattern of falsification of TMI-1 RCS leak rate surveillance tests, although the 11 instances of hydrogen additions during leak rate tests occurred only on 2 of the 6 operator shifts and was limited to 5 control room operators (OI LR-1 at 2).

(4) It was common practice in the preaccident period for control room personnel to discard test results that were deemed invalid (OI LR-1 at 2).

(5) No apparent motive existed for the operators to attempt to alter leak rate test results by making unaccounted-for water or hydrogen additions (OI LR-1 at 1).

(6) No evidence was developed to indicate that any licensed operator was either directed or pressured by supervisory or management personnel to manipulate RCS leak rate surveillance tests (OI LR-1 at 2; OI LR-1 Supp. at 1-2).

(7) A significant amount of information was available to plant management at TMI-1 regarding the effect of hydrogen additions on RCS MUT level indication (specifically, preaccident TMI-1 plant maintenance work requests and the September 1980 Faegre & Benson Investigation Report on TMI-2). Despite this information, the root cause of this effect (the existence

of a loop seal in the MUT level instrument reference leg), was not discovered until the Region I special inspection in the summer of 1983. Memorandum from B. B. Hayes to T. E. Murley, April 16, 1984.

A detailed discussion of each of these conclusions and their supporting bases is presented in the following sections. Section 4.2.1 addresses conclusions 1, 2, and 3 and Sections 4.2.2 through 4.2.5 cover conclusions 4 through 7, respectively.

4.2.1 Whether Leak Rate Tests Were Deliberately Falsified

On the basis of the relatively small percentage of questionable test results identified by the Region I special inspection, the investigation attempted to determine whether or not there was a consistent pattern to the questionable test results and whether a motive existed for the operators and their supervisors to attempt to manipulate leak rate test results (memorandum from B. B. Hayes to T. E. Murley, April 16, 1984).

As part of the investigation, all preaccident and current TMI-1 control room operators (CROs), shift foremen, and shift supervisors, who actually conducted leak rate surveillance tests during the period under investigation, were interviewed under oath. In addition, a large number of preaccident and current staff personnel (operational, engineering, instrumentation and control (I&C), and maintenance) and site and corporate management officials were also interviewed (OI LR-1 Ex. 33-112; OI LR-1 Supp. Ex. 1-12).*

Every individual interviewed testified that they were not aware of any willful attempt on the part of any operator to alter RCS leak rate surveillance tests at TMI-1 by making unaccounted-for hydrogen or water additions to the MUT or by any other method. Every individual interviewed also testified that they were never involved in, condoned, or were aware of any systematic pattern of falsification of leak rate tests. OI LR-1 at 17-18; OI LR-1 Supp. at 1.

As discussed in Section 4.2.3 under motive, there were a number of differences that existed between TMI-1 and TMI-2 in the RCS leak rate test area that resulted in significantly less motivation for test falsification on Unit 1. These included a more accurate measurement capability, less restrictive TS leakage requirements, and lower leak rates at Unit 1 (OI LR-1 Ex. 21 at 11).

The Unit 1 Technical Specifications required, in part, that if unidentified RCS leakage (excluding normal evaporative losses) exceeded 1 gpm, the reactor should be placed in hot shutdown within 24 hours of detection (OI LR-1 Ex. 2 at 3-12). The 1 gpm value is a typical specification for pressurized water reactors (PWRs). The Technical Specifications also required that RCS leakage should be evaluated daily when RCS temperature was greater than 525°F (OI LR-1 Ex. 3 at 4-8). The procedure for conducting RCS leak rate tests was contained in Surveillance Procedure (SP) 1303-1.1 (OI LR1 Ex. 4). The plant computer was normally used to compute RCS leak rates. The computer would calculate leak rates on the basis of a 1-to-8-hour time interval. The majority of operator testimony indicated that a leak rate test interval of 1 hour was normally selected (e.g., OI LR-1 Ex. 36 at 5; Ex. 38 at 5). All but two of the questionable leak rate tests evaluated in the Region I inspection report were conducted with a 1-hour test duration. Provided the plant is maintained in a steady-state condition for the entire test period, the error inherent in the leak rate calculation is reduced as the test duration is extended. OI LR-1 Ex. 17 at 26. During the time interval that the test was being run, the procedure cautioned the operators to avoid evolutions such as chemical additions and inventory changes to the RCS. However, if changes were made to the RCS inventory during the test, the known values of the changes were to be provided as additional input to the computer at the end of the test, before the final leak rate calculations were performed by the computer (OI LR-1 Ex. 4 at 3.0).

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*Exhibits to the OI Supplemental Report are so indicated by "Supp. Ex."

There were normally two licensed control room operators (CROs) and one shift foreman [senior reactor operator (SRO)] on watch at each unit. In addition, a shift supervisor (SRO licensed on both units) was also assigned to each shift and split his time between TMI-1 and TMI-2. One of the CROs was designated the "panel" or "console" operator and the other was assigned duties as the "switching and tagging" operator. The "switching and tagging" operator would normally be the operator who would interface with the plant computer to conduct the leak rate test. The operator at the panel was the individual who would control all operational evolutions, including water or hydrogen additions to the RCS MUT and feed-and-bleed operations. E.g., OI LR-1 Ex. 35 at 6.

Because the operator running the leak rate test was not the same operator at the console, it was necessary for the operator running the test to inform the console operator that the test was in progress and for him to avoid making any unnecessary changes to critical plant parameters (e.g., OI LR-1 Ex. 38 at 5). From testimony provided by operators, it is apparent that at times the operator conducting the test either forgot to tell the console operator that the test was in progress or that the console operator forgot the test was in progress and altered the steady-state condition of the plant in such a manner that the results of the leak rate test were affected without the knowledge of the operator conducting the test (e.g., OI LR-1 Ex. 36 at 8). In most cases, when this was detected, the operators would "invalidate" the test and start the leak rate test over again. (The discarding of invalid leak rate tests is discussed in Section 4.2.2.) The preponderance of sworn testimony by the operators indicated that when the plant was maintained in a steady-state condition, with no operator-induced changes, there was little problem getting valid leak rate test results that met the acceptance criteria of the Technical Specifications (e.g., OI LR-1 Ex. 39 at 10; Ex. 42 at 6; Ex. 44 at 7).

While the Technical Specifications required that RCS leak rate be determined every 24 hours, actual leak rate tests were conservatively run once per shift (every 8 hours) as a matter of routine. Therefore, even if the operators experienced some difficulty in obtaining a valid leak rate test on their shift because of plant conditions, they did not feel pressured by management or supervisory personnel to obtain a valid leak rate test because it could be performed on the next shift (e.g., OI LR-1 Ex. 41 at 18).

During the course of the interviews, operators were questioned at length regarding the three principal methods by which leak rate test results were called into question (that is, unaccounted-for additions of water and hydrogen to the RCS MUT, and feed-and-bleed operations). Each of these is discussed below.

4.2.1.1 Hydrogen Additions

The addition of hydrogen to the RCS MUT was required periodically to limit the oxygen content in the RCS and to provide an increased net positive suction head for the RCS makeup pumps. The addition of hydrogen, theoretically, should not have affected MUT indicated level; however, because of the configuration and environment of the MUT level detection instrumentation system at TMI-1, water condensed and collected in the low-pressure reference leg. Under this condition, hydrogen additions to the MUT could cause a temporary increase in the indicated MUT level without actually adding water to the tank. Therefore, the addition of hydrogen at the appropriate time (after the initial data collection and before the final data readings) could affect the leak rate results in a nonconservative manner (that is, the calculated leak rate would be less than the actual leak rate) (OI LR-1 Ex. 1 at 27-28).

The RCS leak rate test procedure, SP 1303-1.1, prohibits the addition of chemicals during the test, although the procedure did not specifically identify hydrogen as a chemical. Some of the operators interviewed stated that they did not consider the addition of hydrogen to the MUT as a chemical addition prohibited by the procedure (e.g., OI LR-1 Ex. 35 at 39).

A review of the 12 hydrogen additions (including the combined hydrogen addition, water addition, and feed-and-bleed operation on January 6, 1979) disclosed that these additions were made only during two shifts, "A" and "D." Five CROs were identified as being involved in these additions and five shift foremen provided approval signatures on the associated RCS leak rate surveillance test calculation documents. OI LR-1 at 18. Four of the five CROs testified they were not aware of the effect of hydrogen additions on leak rate tests at the time. One CRO was aware of the effect (OI LR-1 at 18). Three of the five shift foremen testified that they were not aware of the effect of hydrogen additions on leak rate tests at the time. Two shift foremen were aware of the effect (OI LR-1 at 18-19; OI LR-1 Supp. Ex. 12 at 30).

A technical evaluation of the TMI-1 hydrogen additions was performed by IE Headquarters (OI LR-1 Ex. 21 at 2). Any hydrogen addition while the leak rate test was in progress, had potential to affect the leak rate calculations. However, this evaluation showed that to be most effective in reducing the indicated leak rate, the hydrogen additions would need to be made during the latter half of the leak rate test. The majority of the additions evaluated were not made near the end of the test. Those that were done near the end of the test were accomplished during a period when the actual leak rates were quite low; therefore, there would have been no reason to attempt to reduce the test results. In one case, the hydrogen was added right before the test began and any error caused by adding hydrogen at that time would tend to result in an increase in calculated leak rate. OI LR-1 Ex. 21 at 2-3. The possibility that the hydrogen additions were made at random (as a result of normal plant operations) was considered by IE. In reviewing copies of the strip charts for MUT level indication provided in the Region I inspection report, IE identified three other hydrogen additions of similar short duration during periods where no RCS leak rate tests were being performed.* These additions would tend to support the claim of operators during OI interviews that similar hydrogen additions were made for legitimate operational reasons during normal plant operations (OI LR-1 Ex. 21 at 4).

It is not clear from operator testimony that the addition of hydrogen could always be accomplished from the control room alone during the period under investigation. Some testimony indicated that for safety reasons the hydrogen bottles were left isolated (valved-out) locally. In these cases an auxiliary operator (AO) would be sent to open the local valve first when the operator in the control room wished to add hydrogen. Because of this uncertainty regarding whether hydrogen was available to be added from the control room alone, some operators testified that they would check the valve lineup by opening the hydrogen addition valve from the control room and immediately shutting it again to see the effect on MUT pressure (e.g., OI LR-1 Ex. 35 at 36). Thus, this "testing of the valve lineup" provides a partial explanation of why only small amounts of hydrogen were added to the MUT during some of the leak rate tests.

Log entries were not normally made in the CRO's Log for hydrogen additions (e.g., OI LR-1 Ex. 76 at 54). Therefore, if the console operator inadvertently added hydrogen to the MUT during the performance of a leak rate test and forgot to inform the operator performing the test, there would be no way for either the operator performing the test or the shift foremen reviewing the test results to know that such an error had been made.

In summary, there were legitimate operational reasons why hydrogen was added to the RCS MUT periodically. The frequency of addition varied with plant conditions. Hydrogen additions were not routinely logged in the CRO's Log. Miscommunication between the operator conducting the leak rate test and the operator at the console could lead to inadvertent hydrogen additions being made during the performance of leak rate tests. A detailed review, by Region I of the MUT strip charts of 645 surveillance tests conducted during the period under investigation, identified only 12 occasions where hydrogen was added to the MUT during the performance of leak rate tests. While only 5 CROs and 5 shift foremen were involved in the 12 hydrogen additions, 4 of the CROs and 3 of the shift foremen testified at the time that they were not aware that hydrogen additions could impact leak rate test results. All 10 of the operators testified that they never added hydrogen to intentionally alter the results of leak rate tests. In addition, the IE evaluation of the 12 hydrogen additions concluded that none of the additions would have affected leak rates in such a way that if the additions were not made, the limits for RCS leakage would have been exceeded. On the basis of the information presented in the investigation, the staff finds that the evidence does not support a conclusion that the operators at TMI-1 intentionally added hydrogen to affect the results of RCS leak rate surveillance tests.

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*A telephone conversation between NRR staff and Region I inspectors on June 6, 1984, confirmed that the MUT level indication strip charts for the 1-year period under investigation show numerous hydrogen additions of short duration during periods when no leak rate tests were in progress.

4.2.1.2 Water Additions

When water is added to the MUT during a RCS leak rate test (after the initial data set is taken, but before the final readings are taken), there will always be a reduction in the calculated leak rate unless the addition is properly accounted for in the calculations. The leak rate surveillance procedure, SP 1303-1.1, cautioned the operators to avoid the addition and removal of water from the RCS during the test; however, the procedure provided a data sheet for accounting for operator-caused changes to RCS inventory (OI LR-1 Ex. 4 at 1.0 and 18.0). However, because of an error in the calculational procedure, the program did not account for water expansion as the cold water from the MUT (125°F) heated up in the RCS (579°F); consequently, even a correctly entered water addition would result in an error (OI LR-1 Ex. 1 at 37).

Administrative Procedure 1012, "Shift Relief and Log Entries," Section 3.3.11, required that log entries be made for the addition of boron or dilution of RCS boron concentration (OI LR-1 Ex. 7 at 7.0). Therefore, during the time period under investigation, water additions to the MUT should have been recorded in the CRO's Log.

By reviewing the MUT strip chart recorder traces of 645 surveillance tests performed during the period under investigation, the revised Region I inspection report identified 14 water additions to the MUT (this includes the combined hydrogen addition, water addition, and feed-and-bleed operation on January 6, 1979) that were made during periods in which RCS leak rate surveillance tests were in progress. Ten of the additions were not logged in either the CRO's or the Shift Foreman's Logs. Thirteen of the 14 additions were not factored into the leak rate calculations. The one addition that was included in the calculation did not account for the correct amount of water added. OI LR-1 Ex. 17 at 39. Both the revised Region I inspection report and the IE review of the Region I inspection report identified some additions where the water appeared to be added gradually (jogged) in several small steps, a procedure that could indicate an attempt to hide the addition (OI LR-1 Ex. 17 at 38, Ex. 21 at 4).

However, a review of the 14 water additions did not disclose any visible pattern regarding either a particular operator shift, CROs, or shift foremen (OI LR-1 at 19). A total of 12 different CROs and 7 different shift foremen were involved in the additions (OI LR-1 Ex. 19).

Recalculation of the leak rate data, taking into account these water additions, identified only three instances where the leak rate test results were affected in such a manner that, had these additions not been made, the calculated leak rate would have exceeded the TS acceptance criteria for unidentified leakage (OI LR-1 Ex. 17 at 38). These three additions were made by three different CROs approximately 1 month apart (April 30, 1978; May 26, 1978; and June 21, 1978). The leak rate surveillance tests that were performed during these additions were reviewed and approved by three different shift foremen.

The 19.operators involved, either as CROs or shift foremen, in the 14 water additions, along with other operational personnel who were interviewed, denied any knowledge of, or involvement in, any deliberate attempt to alter RCS leak rate surveillance test results by unrecorded and unaccounted-for water additions to the MUT. The interviewees did admit that water additions could have been inadvertently made during the performance of RCS leak rate tests by the console operator failing to notify the operator conducting the surveillance test that water had been added. Additionally, the interviewees denied gradually adding water during leak rate tests. None of the operational personnel interviewed were aware of any incident in which unaccounted-for water additions were knowingly made and the leak rate surveillance tests were accepted as valid (OI LR-1 at 20).

In summary, out of the 645 leak rate surveillance tests reviewed, 14 showed evidence of water additions being made to the MUT during periods when leak rate tests were being conducted. Ten of these additions were not logged in either the CRO's or Shift Foreman's Logs. Operator testimony classified the failure to make log entries as an operational mistake. The leak rate surveillance procedure, SP 1303-1.1, required operator-induced inventory changes (for example, water additions) to be taken into consideration in the leak rate test calculations. Operator testimony characterized this as miscommunication between the console operator making the addition and the operator performing the surveillance test. While these actions appear to indicate an atmosphere of operational laxity and a failure by operators to comply with approved plant procedures, other facts identified in the investigation supported the argument that these additions were not intentionally made for the purpose of altering leak rate test results at TMI-1. Only 2% of the surveillance tests examined exhibited evidence of unaccounted-for water additions. Of these, only three cases were identified where the TS acceptance criteria would not have been satisfied had the additions not been made. There was no visible pattern of involvement by individual CROs or shift foremen in making the additions. The 14 additions involved 12 different CROs and 7 different shift foremen with no one individual being involved in more than 2 unaccounted-for additions. The sworn testimony of all operators was unanimous in stating that they never participated in, or were aware of, any unaccounted-for water additions knowingly being made for the purpose of altering RCS leak rate surveillance test results. On the basis of the information presented in the investigation, the staff concludes that the evidence does not support a finding that there was any willful or systematic pattern of falsification of leak rate surveillance tests at TMI-1 by unaccounted-for water additions during the period in question.

4.2.1.3 Feed-and-Bleed Operations

Feed-and-bleed operations are usually done to change the RCS boron concentration and the amount of coolant removed is normally equal to the amount added. Performing this operation during a RCS surveillance test would tend to reduce the accuracy of the leak rate test results; however, it would not be an effective means of reducing the measured leak rate unless the amount of coolant added exceeded the amount removed (OI LR-1 Ex. 21 at 6). The leak rate surveillance procedure, SP 1303-1.1, cautioned the operators to avoid boration or deboration while performing leak rate tests; however, the procedure provided a data sheet for accounting for operator-caused changes to RCS inventory (OI LR-1 Ex. 4 at 1.0, 18.0).

Administrative Procedure 1012, "Shift Relief and Log Entries," Section 3.3.11, required that log entries be made for the addition of boron or dilution of RCS boron concentration (OI LR-1 Ex. 7 at 7.0). Therefore, during the time period under investigation, feed-and-bleed operations should have been recorded in the CRO's Log.

The revised Region I inspection report identified 14 feed-and-bleed operations (including the combined hydrogen addition, water addition, and feed-and-bleed operation on January 6, 1979) that were conducted during periods in which RCS leak rate surveillance tests were in progress. Ten of the 14 operations were not logged in either the CRO's or Shift Foreman's logs. Only 1 of the 14 operations was taken into account in the leak rate calculations. OI LR-1 Ex. 17 at 15, 36.

The revised Region I inspection report did not provide the same detailed evaluation for the identified feed-and-bleed operations that it did for the hydrogen and water additions to the MUT. The report listed 14 uncompensated feed-and-bleed operations and, where possible, identified the corrected leak rate values. Nine of the tests were determined to be invalid and corrected leak rate values were not provided. The corrected leak rates for the five remaining feed-and-bleed operations showed that the TS acceptance criteria would not have been exceeded had the feed-and-bleed operations not been conducted (OI LR-1 Ex. 17 at 15 and 36).

The OI investigation report identified the feed-and-bleed operation that was conducted during the leak rate surveillance beginning at 0047 on May 12, 1978, as having a corrected leak rate value that exceeded the TS limit for unidentified leakage (OI LR-1 at 15). The narrative section of the Region I inspection report also supported this conclusion (OI LR-1 Ex. 17 at 7). However, the corrected leak rate for this evolution was stated as being 1.000 gpm (OI LR-1 Ex. 17 at 15). Section 3.1.6.2 of the TMI-1 TS for leakage states that "[i]f unidentified reactor coolant leakage (excluding normal evaporative losses) exceeds one gpm or if any reactor coolant leakage is evaluated as unsafe, the reactor shall be placed in hot shutdown within 24 hours of detection" (OI LR-1 Ex. 2 at 3-12). Thus, the recalculated leak rate was at the TS limit, but was not in violation of the TS acceptance criteria of greater than 1 gpm. IE Headquarters conducted a technical review of 13 of the 14 feed-and-bleed operations identified in the Region I inspection report. (The combined hydrogen addition, water addition, and feed-and-bleed operation evaluation was not included.) OI LR-1 Ex. 21 at 6-8. The review concluded that in only four cases could it be shown that the feed-and-bleed operations were effective in reducing the measured leak rates for the associated tests and that the corrected leak rates for these four were within the allowable limits.

Because no detailed technical evaluation of the feed-and-bleed operations was contained in the Region I inspection report, the OI interviews of the CROs and shift foremen involved in the feed-and-bleed operations concentrated on possible falsification of leak rates by the addition of water or hydrogen to the MUT. The operators were asked, however, if they were aware of any other method besides hydrogen and water additions that could be used to manipulate leak rate test results (e.g., OI LR-1 Ex. 33 at 67; Ex. 35 at 60; Ex. 74 at 42). None of the operators interviewed identified feed-and-bleed operations as a possible method for obtaining altered leak rate test results. When the technical evaluation of the feed-and-bleed events was provided by IE, OI used this information in later interviews with five of the six shift supervisors (OI LR-1 Supp. Ex. 1 at 47; Ex. 2 at 39; Ex. 3 at 69; Ex. 4 at 75; and Ex. 5 at 47). Miscommunication between the operator performing the test and the operator conducting the feed-and-bleed operation was the only explanation offered by the shift supervisors as to the reason why a feed-and-bleed operation would be conducted during the performance of a leak rate test (OI LR-1 Supp. Ex. 1 at 48; Ex. 2 at 40; Ex. 5 at 47).

A review of the 14 questionable feed-and-bleed operations did not disclose any visible pattern regarding particular operator shifts, CROs, or shift foremen. A total of 10 different CROs and 8 shift foremen were involved in these evolutions. No individual CRO was involved in more than two of the questionable tests and no shift foreman was involved in the approval of more than three of the affected tests. OI LR-1 Ex. 20.

In summary, out of the 645 leak rate surveillance tests evaluated, 14 showed evidence of possible feed-and-bleed operations during the periods when the leak rate tests were being conducted. Contrary to Administrative Procedure 1012, only four of these feed-and-bleed operations were logged in either the CRO's Log or the Shift Foreman's Log. The OI investigation did not determine the reason why these evolutions were not logged. Limited testimony, provided by the shift supervisors during this period, offered miscommunication between the console operator performing the feed-and-bleed operation and the operator conducting the leak rate test as a possible reason why such a situation could occur. The actions specified above appear to be additional examples of operational informality and failure to comply with approved plant procedures. However, other facts identified in the investigation tend to support the argument that these feed-and-bleed operations were not performed for the purpose of altering leak rate test results at TMI-1. Only 2% of the surveillance tests examined exhibited evidence of possible feed-and-bleed operations being done in parallel with leak rate testing. Of these, no cases were identified where the TS acceptance criteria would have been exceeded had these operations not been done. No visible pattern of involvement by individual CROs or shift foremen was identified. The sworn testimony of these CROs and shift foremen did not specifically address feed-and-bleed operations as a possible method for manipulating leak rate data. However, each was interviewed extensively on hydrogen additions and water additions to the MUT as other possible methods. Each of the operators denied being involved in any type of leak rate manipulation. On the basis of the information presented in the investigation, the staff concludes that the evidence does not support a finding that there was any willful or systematic pattern of falsification of leak rate surveillance tests at TMI-1 by operators manipulating test results through the conduct of RCS feed-and-bleed operations.

4.2.2 Discarding of Invalid Leak Rate Surveillance Tests

TMI-1 Technical Specification Table 4.1.2, "Minimum Equipment Test Frequency," required that RCS leakage be determined daily when the RCS temperature was greater than 525°F (OI LR-1 Ex. 3). Surveillance Procedure 1303-1.1, "RC System Leak Rate," was the approved procedure that governed how the leak rate tests were to be conducted (OI LR-1 Ex. 4). Testimony provided by operators identified that a more conservative test frequency was established than required by the Technical Specifications. The leak rate surveillance tests were routinely performed every shift (every 8 hours). E.g., OI LR-1 Ex. 72 at 6.

The surveillance procedure could be run either by using the plant computer or by performing hand calculations. In almost all cases, the computer was used to perform the test during the period under investigation. OI LR-1 Ex. 17 at 16.

The test procedure included a specified test duration of 1 to 8 hours. During this period, the procedure included a precaution to avoid the addition and removal of water from the reactor coolant and makeup systems. Makeup or chemical addition to the makeup system and boration or deboration were listed as two of six evolutions that should not be conducted during the test. OI LR-1 Ex. 4 at 1.0. On initiation of the computer calculation, data was taken automatically from hard-wired, predesignated computer points. Manual actions required by the computer method were input specifications, such as test interval (normally 1 hour), and any identified leakage and any operator actions that would affect leak rate results, such as makeup water additions and reactor coolant drain tank (RCDT) pumping. OI LR-1 Ex. 17 at 16.

If, following completion of the leak rate test, the RCS leakage was in excess of the acceptance criteria, the procedure stated that the operator was to proceed as follows:

> 6.4.1 Perform another determination of RCS leak rate.
>
> 6.4.2 Insure that no unaccounted for operator action has occurred that would change the RCS inventory....If such an action has occurred, it invalidates the measurement. Enter this in the Remarks section of the data sheet, clearly describing the action that invalidated the measurement.
>
> OI LR-1 Ex. 4 at 3.0.

TS 6.5, "Station Operating Records," required that records of periodic checks, tests, and calibrations be prepared and retained for a period of 5 years (OI LR-1 Ex. 5 at 6-5). The licensee's Administrative Procedure (AP) 1010, "Technical Specification Surveillance Program," required that when the surveillance tests were completed, the results were to be compared to the acceptance criteria. If any part of the result was unsatisfactory or if problems were encountered while performing the test, it was to be recorded on an "Exception and Deficiency" list, (OI LR-1 Ex. 6 at 9.0 and 10.0). AP 1012, "Shift Relief and Log Entries," required that the start and completion times be recorded (OI LR-1 Ex. 7 at 7.0).

The RCS leak rate test procedure utilized at TMI-1 during the year prior to the accident at TMI-2 contained several inadequacies. These would, in most instances, have calculated leak rate values that were less than the actual leak rates (OI LR-1 Ex. 1 at 6). Because of these errors in the test calculations, the surveillance test records frequently showed negative leak rate results. For example, leak rate test results for the months of May and June 1978 showed that almost 40% (48 out of 121) of the calculated and recorded unidentified leak rates had negative values (OI LR-1 Ex. 17, 12, 14). The leak rate procedure did not prohibit acceptance of test results showing negative leakage. Nevertheless, many of the operators testified that they normally would consider the test invalid if the calculated leak rates were more negative than approximately -0.5 to -1.0 gpm (e.g., OI LR-1 Ex. 38 at 9; Ex. 48 at 19; Ex. 72 at 9).

The investigation determined, through sworn testimony by the preaccident operators, that it was common practice at TMI-1 to discard leak rate test results that were determined to be "invalid." Fourteen of the 18 CROs, 6 of the 8 shift foremen, 4 of the 6 shift supervisors, and the Supervisor of Operations all testified that they were aware of this practice (e.g., OI LR-1 Ex. 36 at 7; Ex. 75 at 8; Ex. 107 at 13; Supp. Ex. 5 at 10). Except for a former TMI-1 Plant Superintendent (J. O'Hanlon), none of the line managers responsible for TMI-1 stated that they were aware of the practice of discarding invalid leak rate tests [OI LR-1 (O'Hanlon) Ex. 58 at 21; (Seelinger) Supp. Ex. 9 at 13; (Miller) Ex. 106 at 22; (Lawyer) Ex. 104 at 38; (Herbein) Ex. 102 at 16].

According to testimony of the operators, there was no formal guidance provided by management for determining whether a leak rate test was classified as valid or invalid. However, most operators agreed that either large, positive leak rates that were not representative of what other plant instrumentation indicated or large, negative leak rates were routinely considered invalid (e.g., OI LR-1 Ex. 36 at 8; Ex. 44 at 7; Ex. 71 at 6). When an invalid leak rate test result was obtained, the operators would start a new leak rate calculation. When a valid leak rate result was obtained, the invalid test was thrown away. Invalid tests were not recorded in the log (as required by AP 1012); the reasons why the tests were considered invalid were not written in the remarks section of the data sheet (as required by SP 1303-1.1); problems encountered while performing the tests were not recorded on "Exception and Deficiency" reports (as required by AP 1010); and test results were not maintained on file for a period of 5 years (as required by TS 6.5.4).

The majority of operators testified that invalid leak rate tests were caused by several factors such as plant oscillations or transients during the test; operator actions, such as water additions or pumping of the reactor coolant drain tank; computer input error by the operator performing the test; instrument errors; and possible problems with the computer program itself (e.g., OI LR-1 Ex. 70 at 6; Ex. 75 at 7; Ex. 45 at 11; Ex. 33 at 16). The operators indicated that invalid leak rate tests were not indicative of actual plant conditions and, because the information obtained from the computer was in error, they did not believe it was required to be kept. For example, D. C. Janes, a shift foreman during the period under investigation, stated: "If there were obviously an error, our policy at the time was to retain the test that was bad and rerun it, and when we had a valid test, then we would discard the invalid one and submit the valid one....It seems to the best of my recollection that the operators and foremen at the time thought that the intent was to get an accurate leak rate. And if it was obviously way off, we felt that it was in bad faith to turn it in." OI LR-1 Ex. 75 at 8, 9. None of the testimony indicated that the discarding of the leak rate tests that were deemed invalid, was done with an ulterior motive to conceal derogatory information about plant conditions from regulatory officials (OI LR-1 at 25).

Interviewees indicated that there was minimal difficulty in obtaining good leak rates. By and large, they considered the leak rate surveillance procedure to be a valid procedure. Except for one former CRO (J. C. Banks) (Ex. 33

at 16), the operators believed that the tests were reliable and consistent with the status of the plant and that they routinely experienced few problems in obtaining satisfactory leak rate tests. OI LR-1 at 25. However, it is apparent from interviews conducted with the CROs that the performance of RCS leak rate tests at TMI-1 was considered mundane and repetitive and that the actual performance of the tests was approached in a very perfunctory manner [memorandum from B. B. Hayes (OI) to T. E. Murley (Region I) dated April 16, 1984 at 2].

In summary, it appears, from the testimony taken during the investigation, that the practice of discarding what operators deemed invalid leak rates was common practice at TMI-1 as far back as any of the interviewees could recall. There was no formal written policy from supervisory or management personnel that either provided criteria for determining the validity of leak rate results or directed that invalid leak rate tests be discarded. Not logging all tests, not providing proper justification and documentation for invalid tests, and not retaining the invalid test results are violations of plant Technical Specifications and approved plant procedures. However, the evidence does not support a finding that operators were either performing these actions as a deliberate attempt to conceal actual leakage that was in violation of TS acceptance criteria or attempting to conceal this information from the NRC.

4.2.3 Whether There Was a Motive for Leak Rate Falsification

An important element in trying to determine whether there was leak rate test falsification at TMI-1 similar to that which was alleged to occur at TMI-2 was to determine whether there was a motive or need to manipulate leak rate results at TMI-1.

The IE Headquarters review of the Region I inspection report discusses several key differences between TMI-1 and TMI-2 (OI LR-1 Ex. 21 at 8-10). These differences may be summarized as follows:

(1) At Unit 2 the wrong water density was used in the computer calculation of the identified leakage collected in the reactor coolant drain tank (RCDT). As a result, any time that the identified leakage exceeded approximately 2.5 gpm, the computer should have, theoretically, calculated an unidentified leakage rate in excess of the allowable 1 gpm limit, even if the actual unidentified leakage was zero. For the majority of time, during the last four months of operation of TMI-2 the identified leakage did exceed 2.5 gpm. OI LR-1 Ex. 21 at 8.

(2) Both TMI-1 and TMI-2 used a temperature versus RCS density conversion table in their computer programs that only went up to 582°F. This was not a problem for Unit 1 because RCS temperature rarely exceeded 582°F. Unit 2 operated at a higher temperature than this for about a third of the tests reviewed by IE. This deficiency introduced an error of approximately 1 gpm into the results of those tests which exceeded 582°F (OI LR-1 Ex. 21 at 9).

(3) At Unit 1, RCS losses to certain connecting systems such as the RCDT, were not considered leakage and, thus, were subject to the limit for

leakage plus losses of 30 gpm. For Unit 2, these losses were considered to be identified leakage and, therefore, subject to a limit of 10 gpm. OI LR-1 Ex. 21 at 9.

(4) The Unit 1 limit for unidentified leakage was 1 gpm after subtracting an evaporative loss factor of 0.51 gpm. The Unit 2 limit did not include an evaporative loss factor. OI LR-1 Ex. 21 at 9.

(5) The final significant difference between Unit 1 and Unit 2, pointed out by IE, was that the actual leak rates at TMI-1 were lower. Therefore, Unit 1 could tolerate a larger measurement error before calculating an unacceptably high value. OI LR-1 Ex. 21 at 9, 10.

The Region I inspection report identified several procedural inadequacies associated with the TMI-1 leak rate procedure. However, these inadequacies would, in most cases, have lead to a less conservative leak rate calculation (that is, the calculated leakage would have been less than the actual leakage) OI LR-1 Ex. 1 at 6, 22-24.

The consensus of testimony provided by operators and supervisory personnel classified TMI-1 as a "tight" plant in terms of leakage. Operators experienced minimal difficulty obtaining acceptable leak rate test results (e.g., OI LR-1 Ex. 41 at 15; Ex. 44 at 13; Ex. 76 at 76; Ex. 77 at 18; Supp. Ex. 1 at 8; Supp. Ex. 2 at 8-11). As discussed in Section 4.2.2, when invalid leak rates were obtained, operators identified the problem in most cases as being caused by plant oscillations or operator-induced errors. None of the operators, supervisory personnel, or management officials interviewed were aware of any actual leak rate problems at TMI-1 during the period under investigation.

In summary, the investigation does not support a finding that there was a motive or need to cheat on leak rate tests at Unit 1 as appears to have been the case at Unit 2. The recalculation of leak rates by Region I and IE Headquarters did not identify actual leak rate problems for Unit 1 during the 1-year period that was evaluated. On the basis of the technical analysis performed by IE and Region I, combined with the sworn testimony of the operators and management personnel, the staff concludes that there was no apparent motive or need to falsify leak rates at TMI-1.

4.2.4 Whether There Was Management Involvement in Any Leak Rate Falsification

As stated in Section 4.1, the purpose of this investigation was to determine if there was a systematic pattern of falsification of RCS leak rate surveillance test data by operators at TMI-1 and, if so, to what extent licensee's management was cognizant of and/or involved in such activities. This section addresses the latter half of this question.

On the basis of the information presented in Sections 4.2.1 through 4.2.3, the staff has concluded that the evidence does not support a finding that there was any willful or systematic pattern of manipulation or falsification of leak rates at TMI-1. In addition, there was no apparent motive for operators to manipulate leak rate tests. The operators experienced only minimal difficulty performing leak rate tests and obtaining results within the allowable TS limits. The investigation did identify apparent violations of the

Technical Specifications and approved plant procedures by operators not logging all tests, not providing proper justification and documentation for invalid tests, and not retaining test results deemed to be invalid. This latter practice was common and known to be occurring at the time by the majority of CROs, shift foremen, shift supervisors, and the Supervisor of Operations. However, the evidence did not identify that these actions were being performed either as a deliberate attempt to conceal actual leakage that was in violation of the Technical Specifications or to conceal this information from the NRC.

During each interview, licensed and unlicensed CROs were specifically questioned regarding real or perceived pressure from supervisory or management personnel to obtain valid leak rate tests. They were also asked if they were ever directed to perform any actions that would result in the manipulation or falsification of leak rate data by either supervisory or management personnel. Other than the normal pressure placed on the operators to do all things right, testimony by CROs was unanimous that they were never directed by any supervisor or management official to manipulate test data in any matter. None of the operators testified that they felt undue pressure by supervisory or management personnel to obtain leak rates that were within the TS limits. E.g., OI LR-1 Ex. 33 at 23; Ex. 35 at 47; Ex. 36 at 17; Ex. 38 at 30; Ex. 39 at 15; Ex. 40 at 16; Ex. 41 at 18; Ex. 43 at 35.

Similar testimony was obtained from the SROs who were assigned as shift foremen and shift supervisors during the period under investigation. These supervisory personnel stated that they were never pressured to manipulate or obtain good leak rates at TMI-1 by any management official (e.g., OI LR-1 Ex. 71 at 34; Ex. 72 at 31; Ex. 74 at 39; Supp. Ex. 1 at 18; Supp. Ex. 4 at 32; Supp. Ex. 6 at 22). In like manner, TMI station management and corporate management officials also were interviewed under oath. Each of these interviewees (e.g., Arnold, Herbein, Miller, Ross, and Shipman) stated that they neither directed nor were aware of any undue influence placed upon TMI-1 operators or supervisory personnel to manipulate leak rate tests for the purpose of obtaining good leak rate results at TMI-1 (e.g., OI LR-1 Ex. 97 at 23; Ex. 102 at 27; Ex. 106 at 51; Ex. 107 at 73; Ex. 109 at 27).

In summary, there is no basis identified in the investigation that would support the conclusion that management or supervisory personnel placed pressure on the operators at TMI-1 to manipulate or falsify leak rate test results.

4.2.5 Followup on Makeup Tank Level Indication Problems

On April 16, 1980, the law firm of Faegre & Benson was contracted by Met-Ed to direct an investigation of allegations made by H. W. Hartman, Jr., after WOR-TV, New York, broadcast an interview with him on March 24, 1980. Hartman alleged that leak rate test results were intentionally manipulated for the purpose of obtaining results within the TS limits at TMI-2. He stated that one of the techniques utilized by operators at TMI-2 to alter leak rate results was to add hydrogen gas to the makeup tank (MUT) during the performance of test. OI LR-1 Ex. 113 at 1.

According to the Faegre & Benson Report dated September 17, 1980:

> Under operating conditions, there is no theoretical reason why hydrogen added to the make-up tank even during the performance of a leak rate test would improve the results. Because Hartman had alleged that hydrogen additions were used to improve the results, we reviewed the make-up tank system to see whether any abnormalities might permit this effect to occur.
>
> We discovered that a loop existed in the dry-reference leg tubing which runs from the top of the make-up tank to the make-up tank level sensing instrument. The configuration of the loop is such that any condensation which might gather at the bottom of the loop could form a water plug. Such a water plug, because its density is greater than the density of hydrogen, would distort the effect of pressure changes in the make-up tank which occur when hydrogen is added. Assuming the existence of a water plug, increases in hydrogen overpressure would increase indicated water level in the make-up tank even though the make-up tank water level remained the same. Thus, increases in hydrogen overpressure during a leak rate test could decrease the calculated unidentified leakage in some cases.
>
> OI LR-1 Ex. 113 at 42, 43.

On July 11, 1983, as part of the Region I inspection of reactor coolant leak rate tests at TMI-1, the inspector discovered the existence of a similar loop seal in the dry reference leg of the MUT level instrumentation at TMI-1. Subsequently, the inspector, accompanied by a licensee representative, verified that the U loop (loop seal) in the dry leg was more than 4 feet in height (OI LR-1 Ex. at 30). Followup tests conducted by the licensee and Region I inspectors on July 28, 1983, confirmed that the addition of small amounts of hydrogen to the MUT could, under the proper conditions, cause indicated level in the MUT to increase (OI LR-1 Ex. 1 at 31, 32). As discussed in Section 4.2.1.1, the addition of hydrogen at the appropriate time during leak rate testing can affect the leak rate results in a nonconservative manner.

The OI investigation developed testimony regarding two subtopics related to the loop seal. First, during the preaccident period, was the licensee aware of the existence of the loop seal on TMI-1? Second, if the licensee was not aware of the existence of the loop seal on TMI-1 in the preaccident period, why had the existence of the loop seal not been identified by the licensee following the publication of the Faegre & Benson Report?

Evidence existed, during the period under investigation, as documented in maintenance work requests, that there were periodic problems with MUT level indication (OI LR-1 Ex. 11-15). Entries on these work requests indicated that some members of the plant staff were aware of the effect of water condensation in the low pressure leg of the level instrument. A conclusion can be drawn from the testimony of the operational personnel, instrumentation and control (I&C) technicians, and the plant engineering staff that site personnel failed in the preaccident period to recognize that the collection of water in the dry reference leg and the resultant problem with the MUT level recorder resulted from the existence of the loop seal in the sensing line. Except for periodic draining of the dry reference leg, when a work request was submitted, the licensee did not formally analyze the problem to determine its root cause. OI LR-1 at 22.

During the postaccident period, the licensee's own internal investigation into the Hartman allegations enumerated leak rate test discrepancies and abnormalities at TMI-2, including the identification of a loop seal on the dry reference leg of the MUT level instrument system. Several management personnel were questioned to determine whether the licensee tried to ascertain if the TMI-2 problems pointed out in the Faegre & Benson Report were equally applicable to TMI-1. The majority of these individuals testified that TMI-1 leak rate procedures and hardware were examined as a result of the report; however, the existence of the loop seal was not identified until discovered by the Region I inspection on July 11, 1983. OI LR-1 at 24.

On the basis of the information identified during the investigation, OI has concluded that a significant amount of information was available to plant management regarding the hydrogen effect as a result of the loop seal in the RCS MUT at TMI-2 and its apparent cause and effect on leak rate surveillance tests. Despite this information, no affirmative actions were initiated to determine if the potential existed for the same problem at TMI-1 until the NRC Region I inspection.

The staff concludes that, in hindsight, there was information available to the licensee that could have led to the discovery of the loop seal before July 1983. However, because approximately half of the operators testified that they were aware of the effect of hydrogen additions on MUT level, the exact cause or mechanism that allowed this phenomenon to occur is not considered significant in determining whether leak rate tests were falsified at TMI-1.

4.3 Staff Findings

On the basis of an independent review of the information contained in Investigation Report 1-83-028, "Three Mile Island Nuclear Generating Station (NGS) Unit 1 - Possible Falsification of Reactor Coolant System Inventory Leak Rate Tests," and its exhibits, the staff concludes that the evidence does not support a finding that leak rate surveillance tests at TMI-1 were intentionally or systematically falsified during the period investigated. The staff notes, however, that it is impossible to exclude the possibility that individual operators may have attempted to manipulate test results for some unknown reason. The specific staff findings discussed earlier in this section are summarized below.

(1) Only a small percentage (5.9%) of the 645 leak rate surveillance tests that were conducted at TMI-1 between the period April 1, 1978, and March 31, 1979, and that were examined by Region I, were accomplished during periods when operator-induced evolutions occurred that would call into question the validity of these tests. These include 38 unaccounted-for hydrogen and water additions to the MUT and feed-and-bleed operations. See Section 4.1.

(2) Of the 38 questionable tests, technical analyses by Region I and IE Headquarters, show that, except in three instances, the TS acceptance criteria for unidentified leakage would have been satisfied had the operator-induced evolutions not occurred. This represents only 0.5% of the 645 test records examined. See Section 4.1.

(3) There is no conclusive evidence to indicate that any TMI-1 licensed or unlicensed operator intentionally performed plant evolutions during leak rate testing with the intended purpose of manipulating or falsifying leak rate results. There is also no pattern of specific operator involvement in the questionable tests. The 38 questionable tests involved 12 of 16 licensed and unlicensed CROs and all 10 shift foremen.

The example that would come the closest to showing a pattern would be shift D in which two CROs (P. Chalecki and D. Wooddell) and their Shift Foreman (D. Janes) were involved in 9 of the 38 tests. These tests involved four hydrogen additions, two water additions, two feed-and-bleed operations, and one combined hydrogen addition, water addition, and feed-and-bleed operation during periods when leak rate tests were being conducted. Both Janes and Wooddell have testified that they were unaware of the effect of hydrogen additions on leak rate test results, while Chalecki stated he was aware of the effect and was told not to make hydrogen additions during leak rate testing. All three operators admitted the possibility that accidental additions could have been made during these tests; however, each denied, under oath, that they ever performed any type of evolution to intentionally affect the outcome of leak rate tests. None of the nine tests involving these operators had recalculated leak rates in excess of the TS acceptance criteria.

During the period under investigation, there were six rotating shifts assigned at TMI-1. Therefore, it is reasonable to assume that these operators performed approximately 1/6 of the 645 tests examined or 108 tests. Thus, the nine questionable tests involving these operators represents only approximately 8% of the leak rate tests performed by these individuals. See Section 4.2.1.

(4) There was no apparent motive or need to manipulate leak rate tests at TMI-1. Operators experienced only minimal difficulty in conducting leak rate tests. In most cases, operators attributed any difficulty in performing the tests to either miscommunication between the panel operator and the operator performing the leak rate test or to failure to maintain steady-state conditions during the period the leak rate data was being obtained. As a result of the calculation inadequacies in the leak rate program, negative leak rate results were often obtained. Technical analyses by Region I and IE Headquarters supported the fact that there was no actual leak rate problem at TMI-1 during the period investigated. See Section 4.2.3.

(5) The investigation did not identify any evidence that would indicate supervisory or management personnel placed pressure on the operators at TMI-1 to manipulate or falsify leak rate test results. See Section 4.2.4.

(6) It was common practice, during the period under investigation, for operators to discard what were deemed "invalid" leak rate test results. There was no formal written policy from supervisory or management personnel that either provided criteria for determining the validity of leak rate results or directed that invalid leak rate tests be discarded. This practice was apparently known and condoned by plant supervisory and management personnel up to the level of Manager of Plant Operations for TMI-1 (M. Ross). Testimony of the former TMI-1 Superintendent (J. Seelinger), Station Superintendent (G. Miller), and Metropolitan Edison Vice-President of Generation (J. Herbein) indicated that they were not aware, at the time, that operators were discarding invalid leak rate tests at TMI-1. While the practices of not logging all surveillance tests, not providing proper justification and documentation for invalid tests, and not retaining the invalid tests are violations of plant Technical Specifications and approved plant procedures, the evidence developed during the investigation does not support a finding that the operators were either performing these actions as a deliberate attempt to conceal actual leakage that was in violation of the TS acceptance criteria or to conceal this information from the NRC. See Section 4.2.2.

(7) On June 26, 1984, the staff received the licensee's report entitled "TMI-1 Reactor Coolant Inventory Balance Testing" (Stier Report). The staff performed a review of the report (including appendices) and finds that the conclusions of the Stier Report are consistent with the staff's evaluation of the TMI-1 leak rate issue presented in Section 4.2 with the exception of two points: First, with respect to the design configuration of the MUT level indication, the Stier Report claims the installation of a drain valve on the low point of the "loop seal" at TMI-1 is a major difference between TMI-1 and TMI-2. This valve allows draining of condensation from the loop seal, rendering the effect of hydrogen additions to the MUT at TMI-1 negligible. The staff disagrees. Approximately half of the operators at TMI-1 testified that they were aware of the effect of hydrogen additions on MUT level. Thus, while the drain valve was installed, the frequency of its use is not clear. During an OI investigation, I&C technicians were interviewed regarding maintenance on the MUT level instrumentation. It was established that work requests were initiated by operations personnel because of erratic behavior of the MUT level indication. However, the corrective action did not include using the drain valve to remove condensate from the reference leg (Stier Report at 32). Also, no regularly scheduled preventive maintenance program was established to ensure that condensation was drained from the loop seal at a frequency sufficient to preclude hydrogen additions from having an effect on MUT level indication. The Stier Report argument that the TMI-1 level instrument is not defective because of the existence of a drain valve is moot because condensation and/or valve leakage collected in the reference leg causing erratic MUT level indication. Second, the Stier Report claims it was unable to confirm any of the hydrogen additions and could confirm only 3 of the 14 water additions and 5 of the 14 feed-and-bleed operations. The staff agrees with the Stier Report in that the method of identifying water additions and hydrogen additions to the makeup tank is necessarily subjective (Stier at 53), and, therefore, disagreement in interpretation can be expected. The staff considers its evaluation of the IE inspection and the OI investigation sufficient to conclude that the preponderance of evidence does

not support a finding that leak rate test results were intentionally manipulated at TMI-1. In sum, the staff agrees with the statement in the Stier Report that "even if all the suspected additions had, in fact, taken place, they would have involved such an insignificant number of tests that no inference of test manipulation could reasonably be drawn" (Stier at 60).

5.0 HARTMAN ALLEGATIONS AND RELATED SAFETY CONCERNS

5.1 Background

In May 1979, H. W. Hartman, Jr., a former control room operator (CRO) at TMI-2, made allegations to the NRC regarding improper and unsafe conduct on the part of operating personnel at TMI-2 before the accident. Hartman's allegations included the following three issues:

(1) Some operators at TMI-2 falsified reactor coolant system (RCS) leak rate surveillance test data to provide test results that were within the allowable acceptance criteria of the TMI-2 Technical Specifications (TS).

(2) On one occasion, while performing a reactor startup, the reactor went critical before reaching the procedurally established lower control rod limit for criticality. A startup rate inhibit alarm was received, a source range startup rate meter reading of three decades per minute (dpm) was observed, the shift supervisor directed actions that were in violation of procedures, and a new estimated critical position (ECP) was computed subsequent to startup to satisfy the administrative and recordkeeping requirements.

(3) Surveillance tests performed on the emergency feedwater (EFW) pumps frequently yielded suction, discharge, and flow rate values that did not meet the acceptance criteria. Further, Hartman alleged that each time they were unable to obtain test results that fell within the acceptable limits, inservice testing engineers would develop new reference values (based on the results of the previous test) so that the surveillance test results on the next test were within the allowable acceptance criteria of the Technical Specifications.

OI Hartman Ex. 1 at 4, 10, 12.

Hartman's allegations first came to public attention on March 24, 1980, when WOR-TV in New York broadcast an interview with Hartman on "What's Happening America." In addition to discussing the leak rate and ECP issues, it was implied during the interview that Hartman was harassed and finally forced to resign as a result of voicing his concerns about faulty plant safety equipment and violations of plant operating procedures. OI Hartman Ex. 1 at 15; Ex. 2 at 1.

On March 22, 1980, at the request of IE Headquarters, Region I commenced a special investigation into the Hartman allegations. The investigation identified an additional allegation that was not raised by Hartman: before the accident at TMI-2, a shift supervisor, concerned about leakage from the pressurizer relief and safety valves, allegedly requested permission from the load dispatcher to shut down the plant for repairs; permission was denied. OI Hartman Ex. 1 at 14.

The Region I special investigation into the Hartman allegations proceeded, unimpeded, until April 10, 1980, when TMI-2 control room operators refused to participate in further interviews except under subpoena. Efforts were underway to obtain subpoenas when, on April 28, 1980, the records and investigation were turned over to the Department of Justice (DOJ). At the request of the DOJ, the NRC investigation effort was then suspended. OI Hartman Ex. 1 at 3.

At a Commission meeting on May 24, 1983, the Commission directed Region I to provide a summary status of its suspended, special investigation and for OI to reopen the investigation into the Hartman allegations. Region I provided its summary status of the suspended investigation in a memorandum (OI Hartman Ex. 1) from T. T. Martin (Region I) to H. H. E. Plaine (OGC) dated June 3, 1983. OI reopened the investigation on June 27, 1983.

A separate issue related to the Hartman allegations involves the licensee's investigation into the matters raised by Hartman and the licensee's failure to report, on a prompt and timely basis, the report of that investigation. This issue also is addressed in this section.

The following sections provide a detailed discussion of each of the seven issues.

Section	Issues
5.2	TMI-2 Leak Rate Falsification
5.3	Estimated Critical Position
5.4	Emergency Feedwater Pump Surveillance Testing
5.5	Request to Shut Down TMI-2 to Correct Leakage
5.6	Hartman's Resignation
5.7	Reporting of the Faegre & Benson Investigation Report

5.2 TMI-2 Leak Rate Falsification

5.2.1 Investigation Results on TMI-2 Leak Rate Falsification

As discussed in the introduction to this section, the Region I special investigation into the Hartman allegations began on March 22, 1980. The specific allegations made by Hartman related to TMI-2 leak rate falsification that were investigated by Region I may be summarized as follows:

(1) The pressurizer code safety valves were leaking for at least 3 months before the accident.

(2) The computer program used for computing RCS leak rates was unreliable, frequently yielding unrealistic results, and it became more difficult to get "good leak rates" as the date of the accident approached.

(3) The records of RCS leak rate tests, which documented failures to meet the acceptance criteria of the Technical Specifications, were thrown away.

(4) The operators at TMI-2 were under pressure to get acceptable leak rate test results.

(5) Some operators at TMI-2 manipulated the RCS leak rate test results by (a) entering the wrong data into the computer, (b) adding gas to the makeup tank, (c) adding water to the makeup tank and not entering that data into the computer, and (d) leaking water into the makeup tank while performing a water transfer operation involving other tanks.

OI Hartman Ex. 1 at 4.

As discussed earlier, the Region I special investigation into the Hartman allegations was suspended at the request of DOJ. At that time, a substantial amount of information had been gathered by the investigation team (see Attachment 3 to OI Hartman Ex. 1). After April 28, 1980, the Region I investigation team efforts were directed toward record analysis, documentation of findings, and supporting DOJ. OI Hartman Ex. 1 at 3.

At a Commission meeting held on May 24, 1983, the Commission directed Region I to provide a summary status of its suspended investigation and the Office of Investigation to reopen the investigation of the Hartman allegations in parallel with DOJ. On June 3, 1983, in a memorandum from T. T. Martin (Region I) to H. H. E. Plaine (OGC), the requested summary status was provided. The TMI-2 leak rate investigation conclusions were stated as follows:

> [1] One or both Pressurizer Code Safety Valves were leaking prior to the accident, but not at rates in excess of the Technical Specification limits.
>
> [2] Both the Computer Program and the Hand Calculation Procedure for Reactor Coolant System Leak Rate Tests were inadequate, did yield unbelievable numbers, and did make it more difficult to get good results as the date of the accident approached. Members of licensee management were aware of some errors in the test calculations and the difficulty of getting good leak rates, but failed to take appropriate timely action to resolve Operator concerns.
>
> [3] Records of failed Reactor Coolant System Leak Rate Tests were thrown away in violation of TMI-2 Technical Specification 6.10.1.d.
>
> [4] Contrary to the commitment contained in the narrative of LER 78-68/1T, appropriate personnel were not adequately instructed in the requirements of applicable sections of the Technical Specifications or in the requirement to immediately invoke Technical Specification Action Statements when the associated Limiting Condition for Operation is not met.
>
> [5] Licensee management failed to establish an environment where everyone knew that compliance with procedures and license conditions was a condition of employment.
>
> [6] Some licensed Operators did add Hydrogen gas to the TMI-2 Makeup Tank, during the performance of Reactor

> Coolant System Leak Rate Tests, for the purpose of falsifying test results.
>
> [7] No evidence was found or developed which confirmed or refuted the alleged practice of attempts to falsify leak rate test results by directly inputting the wrong data to the computer typewriter.
>
> OI Hartman Ex. 1 at 8, 9.

As directed by the Commission, OI reopened the TMI-2 leak rate investigation on June 27, 1983; however, because of the constraints by the ongoing DOJ criminal action, the investigation was limited to screening interviews of auxiliary operators and members of the plant engineering staff. Further interviews were planned following DOJ's investigation.

On November 11, 1983, DOJ announced that a Federal grand jury in Harrisburg, Pennsylvania, returned an 11-count indictment charging the Metropolitan-Edison Company with criminal misconduct arising out of the TMI-2 leak rate falsification issue. On February 28, 1984, Met-Ed pleaded guilty to one count of the criminal indictment and nolo contendere to six additional counts. The remaining four counts were dismissed by the government as part of the plea agreement. The court accepted the plea agreement on February 29, 1984.

In the prosecuting attorney's Statement of Facts that was read into the record as part of the trial settlement, three Met-Ed management personnel above the level of shift supervisor were implicated in acts of wrongdoing: J. R. Floyd (TMI-2 Supervisor of Operations), J. Seelinger (TMI-2 Supervisor of Technical Support from January 1977 to November 1978) and G. Kunder (TMI-2 Superintendent of Technical Support from December 1978 through TMI-2 Accident). The involvement of J. G. Herbein (Vice-President for Generation) and/or G. P. Miller (Station Manager) was also alleged. Several senior operations personnel (i.e., shift supervisors and shift foremen) also were identified as having been knowledgeable of, or implicated in, improper activities. In addition, four control room operators (CROs) admitted knowing, observing, or personally manipulating leak rate tests to obtain acceptable leak rate test results. The evidence presented to the grand jury and developed by the U.S. Attorney did not indicate that any of the directors or officers of GPUN, from the time of its organization in 1982 to the date of the indictment, or any of the directors of Met-Ed, during the period covered by the indictment, participated in, directed, condoned, or were aware of the acts or omissions that were contained in the indictment. See Licensee's Notice to Commission, Appeal Board, Licensing Board and Parties dated March 2, 1984, Enclosure 2, Statement of Facts Submitted by the United States (Statement of Facts).

On March 23, 1984, the Commission was briefed by OI on the status of the ongoing investigations related to TMI-1 restart. The Commission provided the following guidance regarding OI's TMI-2 leak rate investigation:

> [1] OI will not duplicate matters resolved in the criminal trial.

[2] OI is to present all Hartman material to NRR. NRR is to screen the material and refer back to OI any matters that warrant further investigation.

[3] OI is to identify in its report to the Commission any individuals that might be culpable or may have had knowledge of the falsification of TMI-2 leak rate data.

[4] OI is to determine if TMI management created a climate that encouraged leak rate falsification to occur, including interviewing Mr. Ross [current TMI-1 Supervisor of Operations], if necessary.

See memorandum from S. J. Chilk (SECY) to B. B. Hayes (OI) and W. J. Dircks (EDO) dated April 2, 1984.

As directed by the Commission, NRR reviewed the available materials concerning the TMI-2 leak rate investigation during April 9 through 13, 1984. The available material included 136 leak rate tests conducted at TMI-2 during the period September 1978 through March 1979 and other data necessary to support the analyses of the leak rate tests. Notes and statements of operators from NRC interviews in 1980 also were available. In addition, material gathered by OI after reopening the TMI-2 leak rate investigation in June 1983 also was available. This material included screening interviews with auxiliary operators, interviews with members of the plant engineering staff, and interviews with some of the dual-licensed operators. OI assisted NRR in identifying and extracting the relevant material from the available records. Additional documentation was provided by OI to DOJ for use during the grand jury proceeding and subsequent criminal trial; however, that material is part of the grand jury proceeding record and has not been released to the NRC. See memorandum from H. R. Denton (NRR) to B. B. Hayes (OI) dated May 3, 1984.

As directed by the Commission, the NRR review did not duplicate matters resolved by the criminal trial. Because the prosecuting attorney's Statement of Facts cleared all directors and officers of the current GPUN organization, no review of corporate involvement was conducted. The involvement of five former Met-Ed management personnel was identified in the Statement of Facts. However, Herbein, Miller, Seelinger and Floyd are no longer involved in activities regulated by the NRC. Kunder, while no longer licensed or involved in TMI-1 restart, is currently employed by GPUN as Manager, TMI-2 Safety Review Group. The staff position regarding Kunder is addressed in Section 13.0 of this report.

At the time of the NRR review, the TMI-1 leak rate investigation field work was complete and the investigation report was in preparation. On the basis of preliminary TMI-1 leak rate investigation results, it was felt that manipulation or falsification of leak rate data at TMI-1 did not occur. On the basis of its subsequent review of the TMI-1 leak rate investigation (see Section 4.0), NRR concluded that none of the operational or management personnel at TMI-1 were involved in culpable activities or had knowledge of falsification of TMI-2 leak rate data.

For the reasons discussed above, NRR's detailed review of the TMI-2 leak rate materials focused on those individuals who were either licensed on TMI-2 or held a dual license for TMI Units 1 and 2 before March 1979. Of the 35 individuals in this category, NRR recommended further joint NRR/OI investigation of some individuals. None of the individuals recommended for further investigation are currently involved in TMI-1 restart activities. Following NRR's review and recommended course of action regarding these individuals, the Commission was briefed on the matter and concurred in the proposed action.

5.2.2 Staff Findings on TMI-2 Leak Rate Falsification

The staff accepts, as fact, the prosecuting attorney's Statement of Facts, read into the record as part of the trial settlement, that five Met-Ed management personnel were involved or implicated in the indictment. The five individuals identified were: J. G. Herbein, Vice-President for Generation; G. P. Miller, Station Manager; J. R. Floyd, Supervisor of Operations for TMI-2; and J. Seelinger and G. Kunder, Superintendents of Technical Support TMI-2. The prosecuting attorney's Statement of Facts also identified individuals who were not implicated in the governments indictment. These individuals included all current directors and officers of GPUN.

The Statement of Facts does not address the issue of M. J. Ross, the current TMI-1 Supervisor of Operations. On the basis of the staff's review of the TMI-1 and TMI-2 leak rate investigations, the staff concludes that no evidence exists that Ross was implicated in either hydrogen or water additions during leak rate testing. No testimony offered by others during interviews implicated Ross in actual wrongdoing or in pressuring operators to obtain acceptable leak rate tests. There is also testimony by other dual-licensed operators indicating that Ross was a stickler for detail and followed procedures. Ross was interviewed under oath by OI on January 25, 1984. During that interview, he stated that he may have performed leak rate tests only once or twice while on shift. It is clear from the testimony provided by Ross and others that Ross spent very little time in the control room at TMI-2 before the accident. Ross stood the minimum required watches to maintain his license (i.e., 4 hours per month at TMI-2). On the basis of the OI investigations, the staff concludes that Ross was not involved in any wrongdoing with respect to leak rate manipulation at TMI-2.

As a result of the criminal trial settlement and on the basis of the NRC investigation, it has been established that four CROs at TMI-2 have admitted knowing of, observing, or personally performing manipulations of leak rate tests to obtain acceptable test results. Therefore, the staff finds that leak rate test results were manipulated intentionally for the purpose of obtaining results within TS limits at TMI-2. It also has been established that because of the existing TMI-2 plant conditions, it was extremely difficult for operators to obtain satisfactory leak rate test results. Thus, a motive existed to manipulate leak rate tests by the addition of either water or hydrogen to the makeup tank in order to meet leak rate requirements for continued operation of the facility. On the basis of these facts, the staff finds that TMI management was responsible for the operational environment that was permissive of poor performance and had loose standards that led to conditions that motivated some operators to falsify leak rate tests. Follow-up action regarding some licensed operators is being handled separately from this proceeding.

The staff findings that falsification of TMI-2 leak rate tests occurred and that negligence on the part of management created, in part, the circumstances that resulted in leak rate falsification, raise questions concerning Met-Ed character or management integrity. These findings are addressed in Section 13.0 as part of the staff's overall position on management integrity.

5.3 Estimated Critical Position

5.3.1 Investigation Results of Estimated Critical Position

During an interview conducted by IE with H. W. Hartman, Jr., on May 22, 1979, Hartman alleged that on one occasion, while performing a reactor startup at TMI-2, the reactor went critical before reaching the procedurally established lower control rod limit for criticality as calculated in the estimated critical position (ECP). Hartman alleged that during the startup: a startup rate inhibit alarm was received; a 3-decade-per-minute (dpm) startup rate was observed on the source range startup rate meter; Shift Supervisor, B. A. Mehler, directed actions that were in violation of procedures; a new ECP was computed after the startup; and the numbers in the ECP were somehow "fudged" to make it right. OI Hartman Ex. 1 at 10.

The only TMI-2 reactor startup that matched the alleged shift composition, time of day, and time of year occurred on April 13, 1978 (OI Hartman Ex. 1 at 10). According to Hartman, the shift composition at the time of the startup included B. A. Mehler (Shift Supervisor), K. R. Hoyt (Shift Foreman), R. R. Booher (CRO), J. M. Kidwell (CRO), and Hartman (CRO). OI Hartman Ex. 2 at 167-168. Hartman recalled that his shift was assigned to take the reactor critical and proceed to 15% of rated power by the end of the shift (0700). According to Hartman, an ECP calculation had been done before the startup by Booher. It was given to Hartman before the startup; however, Hartman stated "things got busy, and I didn't have time to review it." _Id._ at 172. Hartman recalled that the Booher's calculations estimated the reactor would go critical at a control rod height of 52% withdrawn on Group 6/7. On the basis of the Booher ECP, the lower control rod window for criticality was 32% withdrawn on Group 6/7 according to Hartman's statement. Hartman accepted Booher's ECP and commenced the reactor startup. _Id._ at 173.

The next significant event that Hartman recalled during the startup was actuation of a high startup rate control rod inhibit alarm.* Hartman says he did not notice the rapid increase in the source range count rate because, at the time, he was watching the back panel to see whether Group 5 rods were fully withdrawn. When the control rod inhibit alarm was received, Hartman stated he observed the source range detector was registering a startup rate of 3 to 3.5 dpm. _Id._ at 175. At the time of the control rod inhibit,

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*The control rod inhibit function prevents all control rods from being further withdrawn and is actuated when either the startup rate reaches 2 dpm on the source range neutron detector or 3 dpm on the intermediate range detector.

Hartman stated Group 6/7 rods were about 28% withdrawn. This was 4% below Booher's lower window of 32%. Hartman stated that when the control rod inhibit took effect, he began to insert the control rods. Hartman says he began inserting rods based on the "CAUTION" statement given in the "Approach to Criticality" operating procedure. This procedure requires that if the reactor goes critical before the lower window calculated in the ECP, the reactor should be taken subcritical (with a 1% shutdown margin) and a new reactivity balance (ECP) performed, before reinitiating the startup. Id. at 176. Hartman stated that shortly after commencing control rod insertion, he was told by Mehler to stop inserting rods and continue the startup. Hartman recalled Mehler telling him: "You just continue to start going up to 10 to the minus 8 amps. We will refigure another ECP. . . . We have to be at 15 percent power in the morning." Id. at 177. At Mehler's direction, Hartman continued the startup without further incident. Id. at 178. Hartman logged the reactor critical at 10^{-8} amps at 0158 in the Control Room Operator's Log on April 28, 1978 (Id. at 188).

During Hartman's interview on April 29, 1980, with the law firm of Faegre & Benson, Hartman was questioned as to whether he believed that Mehler's statement, "We will refigure another ECP," referred to another calculation that Mehler had already performed or whether it referred to recalculating the ECP at some point in the future. Hartman responded, "it was a fact that they didn't have one, and that they recalculated an ECP after criticality." Id. at 178. According to Hartman, shortly after the incident, Hoyt recalculated the ECP and submitted it to Mehler for signature. Hartman stated that he witnessed Mehler signing the document at about 0200 (i.e., after the startup). The record copy of Hoyt's ECP shows Hoyt's signature at 0045 and Mehler's approval signature at 0100 (i.e., before the startup). Id. at 179. Hartman stated that he saw the original Booher ECP in the wastepaper basket before the end of that particular shift. He does not know who threw it away. Id. at 180.

The Hartman allegations, described above, were investigated by IE (OI Hartman Ex. 1) and by GPU (Faegre & Benson) (OI Hartman Ex. 2). The IE investigation found that the neutron flux trace for the startup of April 23, 1978, was consistent with the alleged control rod operations described by Hartman. That is, the trace showed a period of rod withdrawal terminating at a point of maximum startup rate, a short period of rod insertion, and then rod withdrawn and settling out at about 10^{-8} amps in the intermediate range, before pulling rods to heatup. OI Hartman Ex. 1 at 10. The IE analysis of the neutron flux trace indicated that a maximum indicated startup rate of about 1.5 dpm occurred during the startup.* This calculated value is below the source and intermediate range for the startup rate rod withdrawal inhibit alarm set points of 2 and 3 dpm, respectively. This value also is significantly below the 3-to-3.5-dpm startup rate Hartman alleged he observed during the startup.

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*NRR staff note: This startup rate was based on a 2-inch-per-hour chart speed and the slope of the neutron flux trace using a straightedge; it thus represents the average startup rate over a period of time and not the peak startup rate that may have occurred.

During the investigation, IE requested printouts from the TMI-2 utility typewriter and the alarm computer from Met-Ed. No printout sheets for the period April 22 and 23, 1978, could be located. Thus, the existence or nonexistence of the rod withdrawal inhibit alarm could not be confirmed. Id.

The IE investigation located only one calculation of the ECP for the startup of April 23, 1978 (the Hoyt ECP). The data used in the calculation was available before startup and, therefore, may have been performed before the alleged event. During the course of its investigation, IE interviewed Mehler, Hoyt, Booher, and J. R. Floyd (Supervisor of Operations for TMI-2) concerning the startup of April 23, 1978. Each of these individuals denied any knowledge of criticality outside procedural limits, the alleged sounding of the startup rate rod withdrawal inhibit alarm, the alleged directed violation of procedures, and the alleged "fudging" of an after-the-fact ECP calculation. Id. at 10, 11.

The overall conclusion by IE regarding these allegations was that the physical records of the reactor startup during the mid-shift on April 23, 1978, bore a strong resemblance to the alleged event. However, key elements such as the alarms, startup rates, alleged rod position at peak startup rate,* the recorded entry into Mode-2 operations, and the availability of data supporting Hoyt's ECP calculation challenges the plausibility of the alleged event (Id. at 11).

The Faegre & Benson investigation into the events of April 23, 1978, is quite thorough and detailed. However, other personnel in the control room that evening (Mehler, Hoyt, Booher, and Kidwell) were represented by counsel at the time in connection with government investigations of the Hartman allegations and were unavailable to Faegre & Benson to interview for the purpose of confirming or rebutting Hartman's version of the events. Thus, the reconstruction of events of April 23, 1978, was based solely on Hartman's statements. OI Hartman Ex. 2 at 070.

Some of the principal conclusions reached by Faegre & Benson may be summarized as follows:

(1) The general sequence of events as described by Hartman could have occurred. The report concludes that an initial criticality probably occurred in the source range at about the time (0141) Hartman indicated and that a rod withdrawal inhibit alarm seems to have occurred shortly after that criticality. Id. at 211-212.

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*NRR staff note: Lack of data on alarms prevents a finding on whether a high startup rate rod inhibit signal occurred or not. An analysis of neutron trace records does not preclude a high startup rate (e.g., a high startup rate is possible at low counts in the source range where background noise would result in masking the rate of change of counts on the neutron flux strip chart).

(2) No violations of the TMI-2 Technical Specifications occurred, assuming that Hartman's data as given in his April 29, 1980, interview with Faegre & Benson is relatively accurate (Id. at 212).

(3) The Hoyt ECP calculation was not "fudged," as Hartman originally stated. Hartman verified during his April 1980 interview with Faegre & Benson that it is an accurate calculation. Thus, one of Hartman's most serious allegations that the numbers were arbitrarily changed to validate what had already occurred, was determined to be unfounded (Faegre & Benson at 52).

(4) On the basis of Hartman's 1980 recollection of the Booher ECP input data (boron concentration and rod positions), Booher's ECP value was found to be marginally incorrect for plant conditions at the time the logged criticality occurred (0158). However, different values for xenon concentration can be obtained for use in a given ECP calculation; thus, different ECPs may result. OI Hartman Ex. 2 at 212.

(5) On the basis of three specific scenarios, Faegre & Benson concluded that certain reactor startup procedure steps may have been violated. Depending on what the operators actually knew at the time and assuming that the Booher ECP did exist, the report concluded that:

(a) If Mehler knew of the ECP value calculated by Hoyt before the first criticality at 0141 (as his signature on the Hoyt ECP (0100) would indicate), then Mehler should not have allowed Hartman to use the Booher ECP, or, as a minimum, Mehler should have delayed the startup until the discrepancy between the two ECPs was resolved and the correct ECP given to Hartman for use in the startup. Similar actions should have been taken by the Shift Foreman (Hoyt), who calculated the ECP and signed the document at 0045.

(b) If the Hoyt ECP was not calculated until after the first criticality at 0141, then both Mehler and Hoyt signed their names to the document indicating a time which was approximately 1 hour earlier than the actual calculation was performed, as alleged by Hartman.

(c) If Mehler did not know the Booher ECP was incorrect and the reactor was taken critical at 0141, then criticality was achieved at a control rod height below the procedurally established lower limit as calculated in the Booher ECP. In this case, the procedural requirement to take the reactor subcritical with a 1% shutdown margin was not performed until after the control rod inhibit function was initiated. In addition, a new reactivity balance (ECP) should have been calculated at that point before reinitiating the startup. Id. at 212-213.

(6) In general, independent of the scenarios described in item (5) above:

(a) A reactor startup rate greater than the 1 dpm allowed by the procedure occurred as a result of improper plant monitoring.

(b) Proper communications among fellow CROs and supervisors seemed to be lacking.

(c) Logging of unexpected events in either the CRO's Log, the Shift Foreman's Log, and/or the relevant procedure signoff sheets was not performed.

(d) Proper filing of all required data sheets, the alarm computer printout, and alternate ECPs was not evident.

Id. at 214.

(7) On April 23, 1978, Hartman made an entry in the CRO's Log and signed off on certain procedural steps that appear to contradict statements made in his testimony (Id. at 214-217).

(8) An entry made by Hartman at 0135 that the reactor had entered Mode 2 with Group 6/7 at 18% withdrawn, is consistent only with Hoyt's ECP. This evidence supports the argument that the Hoyt ECP not only existed at the time of the first criticality, but that Hartman knew about it and was using it at the time of the startup. Faegre & Benson at 55.*

In summary, Faegre & Benson found that the event, as described by Hartman, could have happened and is consistent with the objective data. The Hoyt ECP was not "fudged" and it is an accurate reflection of the conditions at TMI-2 at the time of the planned criticality. No violation of the Technical Specifications occurred, assuming Hartman's version of the events is generally accurate. A number of specific startup procedures were not followed and most scenarios suggest that the shift lacked the following control room disciplines:

(1) proper review of an ECP calculation with an authorized approval
(2) maintenance of a proper startup rate at all times
(3) logging of unexpected events
(4) filing of procedures, data sheets, and ECP calculations

Faegre & Benson at 55, 56.

5.3.2 Staff Findings on Estimated Critical Position

On the basis of interviews conducted with Hartman by IE and Faegre & Benson and on the basis of the neutron flux trace record for the TMI-2 startup of April 23, 1978, Hartman's allegations appear plausible, and the staff concludes that the startup scenario, as described by Hartman, likely occurred.

However, Hartman's statement that the ECP of record (Hoyt's calculation) was generated shortly after the plant reached criticality for the second time (at 0158) and that the numbers were arbitrarily changed ("fudged") to support the actual critical rod height, proved to be partly unfounded. Hartman's original allegation, that the numbers were "fudged" was not based on Hartman's review of the document. During his interview with Faegre & Benson on April 29, 1980, Hartman reviewed the Hoyt ECP in detail for the first time. As a result of that review, Hartman concluded that the ECP calculation was technically correct. The Hoyt ECP was within 1% of the actual critical rod height on the morning of April 23, 1978. However, whether the ECP was calculated by Hoyt at 0045 (as indicated by his signature on the document) or whether it was calculated shortly after the startup, as alleged by Hartman, could not be resolved. A technically valid ECP could have been calculated at either time. In addition, there is no independent evidence that the Booher ECP existed except as alleged by Hartman.

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*NRR staff note: Hartman stated that the times of significant events were recorded on a separate sheet of paper during the startup and that his log entries were made later in the shift. His log entry for entering Mode-2 operations was made after the fact and was based upon Hoyt's ECP. OI Hartman Ex. [illegible] at 220-222.

The IE investigation included interviews with the other control room personnel involved in the startup (Mehler, Hoyt, and Booher). Each of these individuals denied all allegations made by Hartman concerning the event. The Faegre & Benson investigation, while very thorough and technically sound, was handicapped by the investigators being unable to interview these same individuals. The staff concludes that the findings of the Faegre & Benson Report show that, as a minimum, loose watchstanding practices likely contributed to poor communications and misunderstandings between control room personnel during startup on April 13, 1978.

On the basis of the evidence developed by both investigations, it is not possible to conclude that procedural violations did occur or that procedural violations did not occur. In any event, these issues are moot with respect to management integrity in that none of the individuals involved are currently in positions responsible for the operation or the supervision of operation at TMI-1. Currently, Mehler is the manager, Radwaste Operations at TMI-1; Hoyt is the Supervisor, Radiological Field Engineering for TMI-2; Booher is a licensed Senior Reactor Operator at Waterford 3; and Hartman is no longer employed in the nuclear industry.

With respect to questions concerning the individual integrity of these employees, the staff believes that it would be improper and possibly factually incorrect to impugn their integrity on such weak and conflicting evidence.

5.4 Emergency Feedwater (EFW) Pump Surveillance Tests

5.4.1 Investigation Results on EFW Pump Surveillance Testing

During interviews conducted by IE with H. W. Hartman, on May 22, 1979, and March 26, 1980, Hartman alleged that surveillance tests performed on the EFW pumps frequently yielded suction, discharge, and flow rate values that did not meet the acceptance criteria of the surveillance procedure. Further, Hartman alleged that each time they were unable to obtain test results that were within the allowable acceptance criteria, new acceptance criteria (reference values) were developed by the inservice testing engineers. The new reference values were based on the results from the previous test. OI Hartman Ex. 1 at 12.

The essence of Hartman's allegation was that the reference values used in the surveillance procedure were frequently changed to make the measured values fall within the acceptable tolerance values stated in the acceptance criteria. As part of the IE investigation effort, a review of the test procedure and the records of completed test results was conducted to determine conformance with the ASME Code* and TMI-2 Technical Specification requirements. The IE investigation established that operators at TMI-2 did frequently experience difficulty in meeting the acceptance criteria of Surveillance Procedure 2303-M27 A/B, "Motor Driven Emergency Feedpump Functional Test and Valve Operability Test." This was confirmed by Hartman's Shift Foreman, K. R. Hoyt, and the Supervisor of Operations for TMI-2, J. R. Floyd. Id.

IE identified deficiencies in the procedure itself and in the way the procedure was performed. Specific procedural inadequacies included:

(1) requiring the isolation of both trains of EFW simultaneously

(2) referencing nonexistent subsection and paragraphs

(3) requiring certain valves to be reopened that were never shut during the test sequence

(4) failing to address the testing of all valves covered by the scope of the procedure

(5) failing to require the recording of certain critical test instrument readings

(6) attempting to control both independent and dependent variables simultaneously

(7) allowing inappropriate delay in declaring equipment inoperable when test acceptance criteria were not met

Id.

Before August 27, 1978, the instrument used to measure differential pressure across the pump did not meet either the procedural requirements or the ASME Code. Several completed test records lacked required information on test instrument identification, test data, or names of individuals performing or approving test results. Id. In addition, some of the pump operability tests resulted in data that did not meet the acceptance criteria of the test. However, while IE's investigation identified a significant number of the deficiencies related to this procedure, it did not identify inadequacies in the way changes were made to the reference values. The test records revealed that analyses of test results, which did not meet the acceptance criteria, were conducted by the licensee and appropriate corrective actions were taken. Where changes were made to the reference criteria, the changes satisfied the requirements of the ASME Code. Id.

IE concluded that licensee management did not adequately review and approve various revisions to the EFW pump surveillance procedure and that procedural recordkeeping requirements were not met on at least three occasions between September 1977 and March 1979. However, they also concluded that with respect to test results that did not meet the acceptance criteria, proper analysis and corrective actions were taken. No objective evidence was found that tampering with the test results or reference values occurred. Changes made to reference values met regulatory requirements. Id. at 13.

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*ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWP and IWV, "Inservice Testing of Pumps and Valves in Nuclear Power Plants."

5.4.2 Staff Findings on EFW Pump Surveillance Testing

IE's investigation confirms Hartman's original allegation that the surveillance tests performed on the EFW pumps frequently yielded data that did not meet the specified acceptance criteria. New acceptance criteria were established when previous values could not be met. However, the changes that were made to the acceptance criteria (i.e., reference values) were made after review and analysis by the inservice testing engineers and these changes satisfied the appropriate requirements of the ASME Code. Deficiencies were identified in the surveillance procedure and in the way the procedure was performed and documented. In a transcribed interview on March 26, 1980, Hartman indicated that he had no basis for concluding that the inservice testing engineers were intentionally manipulating the data in any deceitful manner. The staff finds that Hartman's concern that it was difficult to run these procedures without getting results outside of the allowable acceptance criteria was valid. While IE concluded that the licensee's review, evaluation, and implementation of revised reference values was technically correct, it is apparent that the bases for those changes were not communicated to the operators conducting the tests. Thus, Hartman was not aware that these changes were technically sound. The review of the TMI-1 procedure for EFW pump surveillance testing has not yet been completed. It is currently under review by Region I as part of the licensee's Restart Test Program.

5.5 Request to Shut Down TMI-2 To Correct Leakage

5.5.1 Investigation Results on Request To Shut Down TMI-2 To Correct Leakage

During the course of IE's investigation into the Hartman allegations, control room personnel being interviewed alleged that before the TMI-2 accident, a specific shift supervisor (J. J. Chwastyk) was concerned with high pressurizer relief and safety valve leakage and had requested permission from the load dispatcher to shut down the plant for repairs. This permission was allegedly denied. OI Hartman Ex. 1 at 14. While not the source of the allegation at the time of the IE investigation, on August 22, 1979, C. F. Mell, former CRO in training at TMI-2, was interviewed by staff members of the U.S. Senate, Subcommittee on Nuclear Regulation of the Committee on Environment and Public Works. During this interview, Mell stated that sometime shortly before the accident at TMI-2, he believed, one of the shift supervisors had telephoned the load dispatcher to request permission to shut down TMI-2 for repairs. Mell indicated that the repairs were associated with the leaking pressurizer code safety valves or the PORV. Mell indicated that the load dispatcher had denied permission for Unit 2 to shut down. OI Hartman Ex. 5.

J. J. Chwastyk, Mell's Shift Supervisor before the accident, was interviewed regarding the allegation. Chwastyk denied that he had ever made such a request. Chwastyk indicated that he was concerned about the leakage problem and stated that he may have suggested that the unit should come off the line. He stated it was not his responsibility to take the unit off-line for repairs. He would bring that type of suggestion to the attention of J. B. Logan (TMI-2 Plant Superintendent) or G. P. Miller (TMI Station Superintendent). Chwastyk indicated that the shift supervisor, with good reason, could make the decision to take the unit off-line "unilaterally." In an emergency, the unit would be taken off-line immediately; however, if a shutdown was required and time permitted, Chwastyk indicated he would contact Logan or J. R. Floyd (Supervisor of Operations for TMI-2) first and call Miller prior to initiating the shutdown. OI Hartman Ex. 6.

The IE investigation determined that procedures were in effect before the accident that required permission from the dispatcher to shut down the unit for a planned maintenance outage or reduction in station load. (The same form also is filled out to document forced outages.) OI Hartman Ex. 1 at 14. Requests for planned or maintenance outages are sequentially numbered and copies are kept by the load dispatcher and the plant. During 1979 six "Generating Equipment (Or Reduction) Outage Requests" for TMI-2 were identified by the licensee. Each was sequentially numbered from 79-1 through 79-6. The last request, number 79-6 dated March 6, 1979, requested a power reduction to 65% for a one-half hour duration to allow for turbine valve testing. The request was not completed and subsequently cancelled. Id. The last official request document on file with the load dispatcher was numbered 79-5, dated February 10, 1979. Id.

5.5.2 Staff Evaluation

On the bases of the information discussed above, the staff concludes that there is no reliable evidence to support the allegation that a request was made to the dispatcher by Chwastyk to shut down TMI-2 for reactor coolant system leakage repairs and that his request was denied. Concerns expressed by operating personnel regarding leakage from the PORV and/or code safety valves before the accident is discussed in detail in Section 8.3 of this report.

5.6 Termination of H. W. Hartman, Jr.

5.6.1 Investigation Results

On March 30, 1979, Hartman and other TMI employees returned from a Babcock and Wilcox Company (B&W) training course. While at the TMI Observation Center, Hartman told G. Hitz (TMI-2 CRO) that he did not think he was going to be in after his assigned days off. OI Hartman at 4. Hartman telephoned J. Floyd, the TMI-2 Operations Supervisor later that day to resign and said he would submit a written resignation when he returned to work after his scheduled days off (Id.). Hartman's resignation was written on April 5, 1979, and backdated to reflect resignation as of March 30, 1979 (Id. at 5).

The Faegre & Benson investigation found that Hartman actually submitted a written resignation on March 30, 1979, to be effective April 13, 1979. After his days off, Hartman returned to the site and indicated his desire to withdraw his resignation. At that point, Met-Ed advised him that he would have to undergo psychological evaluation to determine if he could resume his job as CRO (Id.). Hartman agreed to have this evaluation performed by Dr. S. Lecker of Corporate Stress Control Services, Inc. (Stress Control), on April 12, 1979 (Id.). During the psychological evaluation, Hartman answered "true" to the statement: "I have used alcohol excessively" and, in response to another questionnaire, he stated he would like to "control my drinking better." As a result, Dr. Lecker concluded, "While I do not think Mr. Hartman is an alcoholic, he has had a need to resort to the use of this substance to deal with his stress." Id. Ex. 2 at 6.

Following the Stress Control evaluation, Dr. Lecker orally advised Met-Ed that Hartman was not equipped to take the pressure/stress of a job at a nuclear facility (OI Hartman at 5). As a result of this finding, Hartman was not recommended for control room access and hence was not offered employment; that is, his resignation was accepted (Id. at 6).

Hartman's deposition dated August 18, 1982, associated with the GPU v. B&W lawsuit, provided additional information. Hartman was diagnosed as having "labile hypertension" by a psychologist (not a physician). This hypertensive condition is directly related to periods of high anxiety. After the anxiety is removed, the hypertension goes away. Id. Ex. 4 at 277. His blood pressure reading was 180 over 110 when he left employment at Met-Ed at the age of 30 (Id. at 5). Hartman felt "he could not take it any more" (Id. at 6). Hartman said that his earlier comments about being "hassled" were related to startup and test operation (and apparently not to the circumstances surrounding his resignation). Id at 5.

As mentioned in Section 5.1 of this report, Hartman's allegations first came to public attention on March 24, 1980, when an interview with Hartman was broadcast on station WOR-TV in New York during the show "What's Happening America." During this interview it was implied that Hartman was harassed and ultimately forced to resign as a result of raising safety concerns about plant safety equipment.

5.6.2 Staff Findings on Hartman's Termination

The staff concludes that Hartman was not forced to resign because of harassment or intimidation for having raised safety concerns. While the record concerning Hartman's removal is somewhat sketchy and contains some contradictory information, the contradictions are primarily limited to the sequence of time during which certain events occurred.

Hartman took issue with the way in which his WOR-TV interview was edited. He felt that the station tended to "exaggerate and . . . glorify" his concern and felt that his statements were taken out of context (Id. Ex. 2 at 2, footnote). Also, in a signed and sworn statement given on March 26, 1980, Hartman said, "I feel I was forced to resign but not because of safety issue[s] I had raised but I feel it was because of my hypertension."

The staff, therefore, concludes that (1) Hartman was not constantly harassed and threatened about losing his job for expressing his concerns as was implied on "What's Happening America"; (2) Hartman's job was not in jeopardy because he voiced complaints; and (2) Hartman had voluntarily resigned on

March 30, 1979. Id. Ex. 1 at 15. The staff finds that there was no impropriety in the employment termination of Hartman.

5.7 Reporting of the Faegre & Benson Investigation Report

The background of this issue was provided to the Commission in a June 29, 1983, memorandum from the EDO to the Commission. In short, after the Hartman allegations were made public, the licensee retained a law firm, Faegre & Benson, on April 16, 1980, to conduct an investigation into the Hartman allegations. The investigation report, entitled "Results of Faegre & Benson Investigation of Allegations by Harold W. Hartman, Jr., Concerning Three Mile Island Unit 2," is dated September 17, 1980. At a meeting on March 21, 1983, between R. C. Arnold of GPUN and members of the NRC staff team reviewing the GPU v. B&W lawsuit record, Arnold referred to a GPU investigation into the Hartman allegations and noted that GPU was considering giving the investigation report to the DOJ (which was also investigating the matter).

As discussed in the EDO memorandum of June 29, 1983, the Faegre & Benson Report was subsequently forwarded by GPU to DOJ and through DOJ to the NRC with the request from DOJ that NRC maintain the report in confidence. In early April of 1983, the NRC received a copy of the report directly from GPU with no limits placed on its use. The Faegre & Benson Report was discussed at the Commission meeting of March 30, 1983, and the staff was requested to examine whether any reporting requirements were violated by GPU's submittal of the report in 1983, nearly 3 years after the report had been finalized.

The staff also was requested to determine whether the depositions of Hartman taken in the GPU v. B&W lawsuit on July 16 and August 18, 1982, should have been submitted to the NRC. The depositions were received by the staff on March 21, 1983, following a specific request to GPU.

In the EDO memorandum of June 29, 1983, the staff examined these questions and drew the following conclusions:

(1) The creation of the Faegre & Benson Report and the Hartman depositions themselves did not appear to give rise to any new reporting obligation under the plant Technical Specifications or a specific Commission regulation.

(2) The Faegre & Benson Report and the Hartman depositions do not expand the scope of the allegations, resolve any of the allegations, or add substantially to the information of which the NRC was aware. Therefore, there is insufficient basis to support a finding that a "reasonable agency expert" would have been influenced, thus no material false statement by omission was made.

(3) In light of the matter being adjudicated in the TMI-1 restart proceeding, including the Hartman allegations, the licensee should have made a Board notification concerning the Faegre & Benson Report and the Hartman depositions.

OI did not conduct a further inquiry into the circumstances surrounding the reporting of the Faegre & Benson Report and the Hartman depositions in connection with its investigation of TMI-2 leak rate falsification. Thus, the staff's conclusions as discussed in the EDO memorandum of June 29, 1983, remain the basis for the staff's evaluation of this issue today. In the staff's view, the licensee failed to make a timely Board notification concerning the Faegre & Benson Report and the Hartman depositions.

5.8 Conclusion

The results of the staff's review of the Hartman allegations and other related safety issues are documented throughout Section 5. The principal conclusions drawn by the staff are summarized as follows:

(1) The staff finds that falsification of TMI-2 leak rate tests occurred and that negligence on the part of management created, in part, the circumstances that resulted in leak rate falsification. See Section 5.2.

(2) The staff finds it is not possible to conclude whether procedural violations did or did not occur during the reactor startup at TMI-2 on April 13, 1978, as alleged by Hartman. In any event, the issue does not raise questions concerning management integrity. See Section 5.3.

(3) The staff finds that Hartman's concern that it was difficult to perform EFW pump surveillance testing and obtain results within the allowable acceptance criteria was valid. While IE's investigation concluded that the licensee's review, evaluation, and implementation of revised reference values was technically correct, it is apparent that the bases for those changes were not communicated to the operators conducting the tests. See Section 5.4.

(4) On the bases of the information available, the staff concludes there is no evidence to support the allegation that before the accident at TMI-2, a shift supervisor requested permission from the load dispatcher to shut down the plant for repairs because of high leakage from the pressurizer safety and relief valves and that that permission was subsequently denied by the dispatcher. See Section 5.5.

(5) The staff finds that Hartman was not harassed or threatened about losing his job for voicing his concerns about safety issues. Hartman had voluntarily resigned. There is no evidence of impropriety by management in the termination of Hartman. See Section 5.6.

(6) The staff also finds that the licensee failed to make a timely Board notification concerning the Faegre & Benson Report on the Hartman allegations and certain depositions by Hartman. See Section 5.7.

The conclusions concerning TMI-2 leak rate falsification and failure to make a timely Board notification concerning the Faegre & Benson Report are material to the staff's overall assessment of management integrity and are addressed in Section 13.0.

6.0 BETA AND RHR REPORTS

6.1 Background

In January 1982, GPUN retained Basic Energy Technology Associates, Inc. (BETA), to conduct a review of current and projected manpower and overall cost expenditures for the TMI-1 and Oyster Creek nuclear plants. In June 1982, GPUN retained Rohrer, Hibler and Replogle, Inc. (RHR), to assess the attitudes of licensed reactor operators at TMI-1 and Oyster Creek. BETA forwarded its report to GPUN on February 28, 1983. RHR submitted its report to GPUN on March 15, 1983. OI BETA/RHR at 1, 8-9.

On April 22, 1983, H. D. Hukill of GPUN informed an NRC inspection team conducting a special inspection at TMI-1 at that time of the existence of these two reports. On April 25, 1983, the team requested and received copies of the reports with the understanding that they would be returned after review and would not be released to the public. The reports were reviewed and returned during the week of April 25th. OI BETA/RHR at 9-10.

During a May 3, 1983, conference call among several NRC employees to discuss the significance of these reports to the current inspection, J. R. Goldberg (OELD) raised a concern about the reportability of the BETA and RHR Reports as information relevant and material to issues involved in the TMI-1 restart proceeding. On May 4, 1983, H. L. Thompson (NRR) directed the inspection team to obtain and review copies of these reports. OI BETA/RHR at 3, 10; BETA/RHR Ex. 17 at 2.

Between May 5 and 9, 1983, Goldberg had telephone conversations with E. Blake and G. Trowbridge, counsel for GPUN in the TMI-1 restart proceeding, concerning the reportability of the BETA and RHR Reports as a Board notification to the Commission and the ASLAB. After examining the reports, counsel for GPUN informed Goldberg of their opinion that the information within the reports was not "relevant and material" and that GPUN was not obligated to make a formal notification in the restart proceeding. BETA/RHR Ex. 17 at 2.

A meeting was held with GPUN and their consultants, BETA and RHR, on May 9, 1983, at the request of the NRC staff to discuss the BETA and RHR Reports. During this meeting, H. R. Denton (NRR) urged R. C. Arnold (GPUN) to provide the two reports to the Commission and the ASLAB as a Board notification in the TMI-1 restart proceeding. Arnold maintained that the reports were not relevant and material and thus did not warrant a Board notification. Denton made it clear that if GPUN did not provide the reports as a Board notification, the NRC staff would. On May 10, 1983, Blake informed Goldberg that a Board notification would be made by GPUN, but not until GPUN obtained supplemental letters from BETA and RHR that explained the purpose of the studies. These letters would be transmitted as part of the Board notification. The BETA and RHR Reports, together with the two supplemental letters, were provided to the Commission and the ASLAB on May 16, 1983. BETA/RHR Ex. 17 at 3-4; OI BETA/RHR at 4, 12-13.

On June 2, 1983, the Commission requested the staff to review the contents of the BETA and RHR Reports and provide the results to the Commission and ASLAB. In October 1983, the staff issued Supplement No. 4 to NUREG-0680, which contained the staff's evaluation of the contents of the BETA and RHR Reports.

In a June 14, 1983, memorandum, the NRC Executive Legal Director concluded that both the BETA and RHR Reports were relevant and material to issues in the TMI-1 restart proceeding and that GPUN ". . . can be considered to have failed to meet its duty to make Board notifications and its obligation under Section 186 [of the Atomic Energy Act] by failing to provide the BETA and RHR reports in a more timely fashion" (BETA/RHR Ex. 27 at 5). On June 27, 1983, the EDO requested that OI investigate the circumstances and reasons why GPUN did not provide the BETA and RHR Reports to the NRC at an earlier date (OI BETA/RHR at 1). OI's report of its investigation was issued on April 16, 1984.

6.2 Investigation Results

The investigation did not disclose any evidence of a deliberate attempt or conscious management decision by GPUN to withhold the information in the BETA and RHR Reports from the NRC (OI BETA/RHR at 4). The evidence demonstrates, rather, that until the NRC staff raised the issue of reportability, GPUN did not consider the possible need for a Board notification. Consistent statements to this effect were provided by R. C. Arnold (BETA/RHR Ex. 1 at 27, 36), H. D. Hukill (BETA/RHR Ex. 11 at 32), E. L. Blake (BETA/RHR Ex. 20 at 12-13 and H. M. Dieckamp (BETA/RHR Ex. 21 at 15), and P. R. Clark (BETA/RHR Ex. 2 at 16, 32, 43). Similar testimony was given by interviewees connected with BETA and RHR: R. W. Bass (BETA/RHR Ex. 3 at 12, 15, 22), W. Wegner (BETA/RHR Ex. 4 at 13, 37-38), and P. F. D'Arcy (BETA/RHR Ex. 7 at 26-27). In the words of Dieckamp:

> [A] failing on our part was to have not explicitly raised that question of Board Notification, and then having provided a record of conscious decision-making relative to it. Somehow, it never even came up. Internally, we somehow did not sense that these reports were sufficiently close to that obligation that we even bothered. BETA/RHR Ex. 21 at 15-16.

After the NRC staff raised the issue of Board notification responsibility, GPUN resisted the suggestion that the BETA and RHR Reports should be formally reported (OI BETA/RHR at 3, 12, 14). GPUN's counsel in the TMI-1 restart proceeding expressed their view that the reports did not contain relevant and material information (OI BETA/RHR at 11). In the absence of an obligation to provide the reports, GPUN was reluctant to see them disclosed to the public (OI BETA/RHR at 12). As to BETA, GPUN believed that certain recommendations for reduced staffing levels could adversely affect organizational morale (OI BETA/RHR at 15). As to RHR, GPUN was concerned that the breach of interviewee confidentiality would handicap any future audits or surveys of employee attitudes and perceptions (OI BETA/RHR at 15). A concern also was expressed that portions of the reports could be taken out of context and misinterpreted (OI BETA/RHR at 3). Arnold stated that his decision to comply with the staff's request for a GPUN Board notification was based on his acceptance that the staff's concerns overshadowed those of GPUN and his recognition that the staff would make the notification if GPUN did not (OI BETA/RHR at 14-15).

As a result of the BETA and RHR reportability issue, steps were taken by GPUN to remind its employees to be sensitive to reportability issues and to provide guidance on the performance of reporting obligations (BETA/RHR Ex. 2 at 20, 22; BETA/RHR Ex. 11 at 46-47; BETA/RHR Ex. 19 at 33-34).

6.3 Staff Findings

The staff has previously concluded that the licensee can be considered to have failed to meet its duty to make Board notifications and its obligations under the Atomic Energy Act by failing to provide the BETA and RHR Reports in a timely manner. For example, the information in the RHR Report concerning operator attitudes toward emergency procedures, which resulted in the identification through staff interviews of operator concerns with the Small Break Loss of Coolant Emergency Procedure, is in the staff's view clearly relevant and material to the TMI-1 restart proceeding (see TMI-1 Restart Supp. 4 at 3-14). The staff is satisfied, however, on the basis of the results of OI's investigation, that there was no deliberate attempt or conscious management decision by GPUN to withhold the information in the BETA and RHR Reports from the NRC. The evidence demonstrates, instead, that GPUN lacked an effective process for the consideration of possible reportability issues arising from consultant reports. GPUN has now initiated such a process.

On June 19, 1984, the ASLAB issued a Memorandum and Order (ALAB-774) in the restart proceeding denying an intervenor motion to reopen the record based, in part, on the OI investigation concerning the reporting of the BETA and RHR Reports. The ASLAB stated that it was unable to reach a conclusion that the licensee was legally obligated to release these reports more promptly and "voluntarily" than he did. ALAB-774, 19 NRC __, slip op. at 10 (June 19, 1984). The ASLAB found that whether the BETA and RHR Reports are "material" is "a question not readily answered." Id., slip op. at 12. The ASLAB also found that the licensee acted with reasonable promptness when reportability was made an issue by the staff. Id., slip op. at 13-14. In conclusion, the ASLAB found "no improper action by licensee with regard to the reporting of the BETA and RHR studies and, accordingly, no basis for reopening the record on that event." Id., slip op. at 15.

The staff does not find, in the record compiled by OI on BETA and RHR, any basis for questioning the managerial integrity of any individual involved in these matters. However, the licensee's failure to have undertaken an evaluation of the BETA and RHR Reports for the purpose of assessing possible reportability issues represents a lapse in the performance of the licensee's regulatory responsibilities. The episode will be assessed as one part of the overall evaluation of management integrity in Section 13.0 of this report.

7.0 TRAINING

7.1 Preaccident Training

7.1.1 Background

In the course of the NRC staff review of the GPU v. B&W lawsuit, a memorandum by A. Tsaggaris, dated April 27, 1976, was identified that raised questions about management knowledge of, or involvement in, failures to comply with NRC training requirements (*see* NUREG-1020, Section 10.3). The memorandum was directed to J. G. Herbein, J. J. Colitz, and G. P. Miller and concerned problems in the requalification program for non-shift personnel (including Herbein, Colitz, and Miller) related to poor lesson attendance, delay in completing makeup lessons, and insufficient time spent in the control room. The memorandum also stated: "We are required by federal law to meet certain requirements for licensed individuals and in several cases we do not meet them." A. Tsaggaris was the Supervisor of Training at TMI from January 1976 until the spring of 1977. His responsibilities were for Units 1 and 2. He is no longer employed by Met-Ed or GPU. An NRC investigation was conducted to determine facts underlying the Tsaggaris memorandum of April 27, 1976. The results of this investigation are in OI Report Q-1-84-004, March 22, 1984, "General Public Utilities Nuclear (GPUN)/Possible Training Irregularities."

Additionally, in a memorandum to J. P. O'Hanlon, the TMI-1 Plant Superintendent, dated June 17, 1977, T. L. Book, a former TMI-1 Shift Foreman, discussed the inadequacy of reactor operator training and implied that the number of hours of training recorded in the operator training records was not correct. The contents of this memorandum were the subject of a previous OI investigation (OI Report Q-1-83-014, May 31, 1983). Also, an undated memorandum (approximately June 1977) to G. Kunder, TMI-1 Supervisor of Operations, from L. G. Noll, then a Shift Foreman, implied that other shifts at TMI-1 were falsifying training records. The contents of this memorandum also were the subject of a previous OI investigation (OI Report Q-1-83-015, July 26, 1983).

In NUREG-1020LD, Section 10.3 at 10-7, the staff "requested that OI conduct a further investigation into training program irregularities as part of the Keaten Investigation inquiry." Additionally, a memorandum to B. B. Hayes (OI) from H. R. Denton (NRR) dated November 7, 1983, discussed training irregularities and suggested possible areas of inquiry. These areas included the Tsaggaris memorandum; actions taken by Herbein, Colitz, and Miller in respect to that memorandum; and the relationship, if any, to the Book and Noll memoranda.

The investigation (OI Training) also explored the issue of whether the GPU Accident Review Task Force report (Keaten Report) deliberately tried to exclude the identified training problems. A. Tsaggaris was a member of the Keaten task force and participated in the preparation of the report.

7.1.2 Investigation Results

The investigation report stated:

> The term in the A. Tsaggaris memorandum "non-shift personnel" applied to any licensed individual who was not a member of an operating shift such as the Supervisor of Operations or a Unit Superintendent. In order to ensure that non-shift personnel would log in the necessary number of hours of control room time to meet the NRC standards for biennial requalification as required by 10 CFR Part 55, Appendix A, Tsaggaris established an internal program requiring these individuals to spend a stated number of hours per month in the control room. The purpose of the program was to avoid a situation in which an individual would not have spent any time in the control room for several months and be forced to catch up to meet the federal requalification requirements. Tsaggaris currently believes that it was a failure on the part of several individuals to log in sufficient control room time on a monthly basis to which he was referring in the April 1976 memorandum rather than a violation of the NRC requalification requirements. Tsaggaris could not recall the specific individuals to whom he was referring in the April 1976 memorandum. OI Training at 2.

Tsaggaris' statement during the OI interview that the 4-hours-per-month watch in the control room is not an NRC requirement, is correct. NRC required 48 hours of watch per year. Thus, failure to stand 4 hours of watch per month would not, in itself, be a violation of NRC requirements.

Tsaggaris stated he was not aware of any violations of Federal regulations governing training while he was Supervisor of Training at TMI and emphasized that his memorandum was not addressing actual instances of noncompliance (Id.). Additionally, Colitz, Herbein, and Miller were not aware of any willful violations of Federal regulations in the requalification program (Id. at 2-3).

In its approval letter to the licensee dated March 21, 1974, the AEC found the Operator Requalification Program (Amendment 47 to TMI-1 FSAR) acceptable, subject to the incorporation of comments by the Atomic Energy Commission (AEC). One of the comments stated: "to comply with the requirements of Appendix A, a statement should be included that no more than 50% of the FSR [Fundamentals and System Review] program may be accomplished through the means of films, videotapes and/or individual study." Thus, the lack of attendance at scheduled training lessons would result in violations of NRC requirements. The following facts from the Tsaggaris memorandum lead to the conclusion that some individuals likely did not attend lessons for 6 months and, therefore, could not meet NRC requirements for 50% attendance at FSR lectures. The memorandum stated: "Poor lesson attendance (in some cases no lesson attendance) . . . The tendency now is not to attend lectures and just do the makeup assignments. . . . I am just now receiving makeup material that was taught back in early fall."

The second potential violation identified by the Tsaggaris memorandum is the absence from watch-standing duties for more than 4 months. The memorandum stated: "We have some people, who have not logged time in the control room for the last six to eight months."

Amendment 47 to the Final Safety Analysis Report described the licensee's Four Month Absence Program as follows:

> If a licensed person has not actively carried out the functions of his license for a period in excess of four months he shall:
>
> (a) review all materials presented or schedule to have been presented in the OR lecture series for the period of inactivity
>
> (b) be given an oral examination on the applicable section of the OR lecture series and the current plant status
>
> Upon receipt of a satisfactory rating, the licensed person shall be certified by the Operations Supervisor, Training Coordinator or other suitable qualified person designated by the Station Superintendent and returned to normal duties.

In addition to the licensee program, the AEC required: "A certification of a satisfactory rating must be made to the AEC prior to the individual's return to licensed duties." Administrative Procedure 1006, "Metropolitan Edison Operator Requalification Program," implemented the Four Month Absence Program as modified by the AEC requirement. However, NRC files do not include any licensee certification of a satisfactory rating or any approval by AEC to return these operators (listed below) to normal licensed duties.

The Tsaggaris memorandum indicates that more than one non-shift licensed operator had not stood watch in the control room for 6 to 8 months. The following individuals were licensed non-shift personnel at TMI-1 at that time:

Nelson Brown
James Floyd
George Kunder
Dennis Boltz
James O'Hanlon
Joseph J. Colitz
John G. Herbein
Gary Miller
William Marshall
James Seelinger

Herbein's (Station Superintendent) license expired February 22, 1976, and was not renewed. In a letter dated October 20, 1976, Herbein advised the NRC that Miller (Unit 2 Superintendent) had stopped his participation in the requalification program and was no longer permitted to perform licensed duties. Colitz's (Unit 1 Superintendent) license (SOP 2049-1) was renewed on February 23, 1976. If the Tsaggaris memorandum was referring to failure to stand watch on the part of Herbein, it is possible that because his license was not renewed, Herbein was not involved in violations of NRC requirements.

Miller's license was continued for 6 months after the Tsaggaris memorandum. The other eight licensed off-shift operators maintained their licenses and thus were required to participate in the requalification program. Because at least two operators failed to stand watch for more than 4 months and, assuming that Herbein was one of these operators, it appears that a violation of the four-month-absence program on the part of at least one other operator occurred. However, the OI investigation did not develop evidence to indicate which non-shift operators failed to stand their required watches.

The staff accepts the Tsaggaris memorandum as fact. As discussed below, Tsaggaris' rationale in 1984 for concluding that NRC requirements were not violated is incomplete and not credible. Tsaggaris had been in his position as Supervisor of Training since January of 1976. His memorandum indicates that his initial audit covered periods before January 1976. For example, he had to review control room records for more than 8 months to conclude that some licensed individuals had not stood watch for at least 6 to 8 months. Also, the individuals who were failing to perform in accordance with requalification program requirements were senior managers, some of whom were Tsaggaris' supervisors. It is likely, therefore, that Tsaggaris carefully reviewed his audit results before sending a memorandum to station and plant management (Colitz, Miller, and Herbein) that was critical of their personal performance. On the basis of the evidence, the staff concludes that in the 1975-1976 time frame non-shift licensed operators (i.e., station and plant management) failed to comply with NRC requalification requirements.

The Noll memorandum implied that other shifts at TMI-1 were falsifying training records (OI Training at 6). The Book memorandum implied that the number of hours of training recorded in the operator training records was not correct (Id.). These memoranda relate to personnel assigned to operating shifts. The Book memorandum and the Noll memorandum express frustration on the part of the authors with respect to condition of the Requalification Training Program. As discussed previously, the Tsaggaris memorandum relates to failures of licensed non-shift operators (management personnel) to meet requalification program requirements (OI Training Ex. 1). Clearly these managers did not set a good example for other licensed operators in the Requalification Training Program. This raises questions concerning management's attitude toward the operator requalification program. A poor attitude on the part of management toward operator requalification would likely foster poor attitudes and performance on the part of other licensed operators.

The OI investigation determined the Tsaggaris memorandum did not come to light during the Keaten task force investigation and, thus, did not influence the Keaten Report (Id. at 4). R. W. Keaten did not specifically remember the Tsaggaris memorandum, but did recall discussing, during the investigation by the task force, some of the topics addressed in the memorandum (e.g., poor lesson attendance) (Id. at 4). Keaten explained that the task force did not investigate or audit the training area, rather, they interviewed the Training Department staff about their perception of the training area (Id. at 4-5). Tsaggaris stated that his primary assignment on the task force was in the area of emergency planning and that he was not involved in the training aspects of the report because the task force felt that he may not have been able to be objective because he had had responsibilities for training at TMI

(Id. at 5). Tsaggaris did not bring the April 1976 memorandum to the attention of the task force (Id. at 5). The Book and Noll memoranda do not appear to have had any effect upon the Keaten Report (Id. at 7).

7.1.3 Staff Findings

The investigation reinforced the staff's prior conclusion that the licensee had problems with its training program before the accident at TMI-2. Several TMI investigations have identified that the preaccident program was deficient. However, the issue of concern for restart of TMI-1 is postaccident training of licensed operators. A revised training program was put into place in the TMI-postaccident period. The ASLB found that the licensee had in place, at TMI-1, a comprehensive and acceptable training program (August 27, 1981, PID 91-276 at 159; 14 NRC at 475). The ASLB in the reopened proceeding on cheating found that its conclusions of August 27, 1981, should remain in effect (July 27, 1982, PID 91-2396 at 170). On May 24, 1984, the ASLAB reopened the management phase of the hearing concerning the adequacy of the postaccident training program on the basis of a concern for the impact of cheating (see Section 7.2.2) on the quality of the postaccident training program.

Despite the focus of the inquiry into postaccident training adequacy in the restart proceeding, evidence of preaccident training irregularities may be relevant to the management integrity issue. The staff finds that the preaccident training program deficiencies are indicative of either a poor attitude on the part of management or a careless disregard of their management responsibilities. Thus, the preaccident training irregularities investigated by OI would be material and relevant to management integrity, if the management involved in the preaccident time frame was still involved in the postaccident time frame.

The OI investigation developed testimony, on the basis of individuals' recollections, that actual noncompliances did not occur. The OI investigation did not determine which individuals failed to stand watch for more than 4 months and whether those individuals resumed licensed duties without being certified to the NRC. Neither did the OI investigation determine which individuals failed to attend scheduled training lessons. These matters were discussed with the staff before the OI investigation was closed out. The staff concluded that further investigation to develop these facts was not warranted. The staff accepts, as fact, the written statements contained in the Tsaggaris, Noll, and Book memoranda. The impact of these training irregularities are considered in the staff's overall position on management competence and integrity in Section 13.0.

7.2 Postaccident Training

7.2.1 Background

A partial initial decision (PID) concerning the management phase of the TMI-1 restart proceedings was issued on August 27, 1981. The ASLB concluded the licensee has in place, at TMI-1, a comprehensive and acceptable training program (August 27, 1981, PID ¶276). However, immediately before issuing this PID, the ASLB received notification of alleged cheating by two TMI-1 shift supervisors on the April 1981 NRC senior reactor operator (SRO) examinations. Later the licensee also notified ASLB of its own concern about answers on some licensee-administered examinations. The ASLB reopened the evidentiary record to inquire into these matters and appointed Administrative Judge G. L. Milhollin Special Master to preside over the hearing. The record of the reopened hearing by Administrative Judge G. Milhollin is at 15 NRC 918 (1982).

During the July 1981 investigation into cheating on operator licensing examinations (HQS-81-003), the licensee advised the NRC that J. J. Floyd* had obtained assistance in completing two of the four areas on an examination that was part of his requalification program for an NRC SRO's license. In an August 3, 1979, letter signed by G. Miller to the Commission certifying Floyd for renewal of his SRO's license, an examination score was cited that was obtained on a section partially completed by someone else. The ASLB concluded that the licensee's letter of August 3, 1979, was "a false material statement to the NRC" (July 27, 1982, PID ¶2296). An OI investigation was initiated to determine the circumstances surrounding Floyd's certification to the NRC (OI Report H-82-002, March 21, 1983).**

7.2.2 Investigation and Hearing Results

7.2.2.1 Individual Cheating

The investigation of cheating on the NRC SRO examination of April 1981 and licensee-administered examinations involved a number of individuals. Because of a stipulation of confidentiality agreed to by the parties, some of the individuals are referred to by a system of letters instead of names. Individuals that were mentioned in the hearing were designated as O, W, G, H, H. Shipman, GG, W, MM, P, C. Husted, U, S, Y, VV (Floyd), G. Miller, M. Ross, J. Herbein, H. D. Hukill, J. Wilson, and R. C. Arnold. The relationship of Herbein, Hukill, Wilson, and Arnold to the incidents is important because it shows management's responses to the issues and thus relates to management integrity.

As a result of the reopened proceeding and subsequent appellate review, the following facts and conclusions regarding cheating were developed. Six individuals (O, W, G, H, GG and Floyd) cheated and/or cooperated on NRC or licensee examinations or both. One individual, Husted (who did not cooperate during the investigation), may have solicited information on an NRC examination from another individual, however there was insufficient evidence developed to support a definitive conclusion. Another individual, who was not identified, solicited the answer to an examination question from H. Shipman.

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*Floyd was referred to as VV during the restart proceeding; a waiver of confidentiality has been filed by Floyd (see Licensee Notice to the Commission, ASLB, ASLAB, and parties, dated June 19, 1984). For this reason, Floyd's name is used in this report rather than the letter designation VV.

**This report, which was referred to the Department of Justice (DOJ) for review, is, at the request of DOJ, not being released at this time (letter from Stephen S. Trott (DOJ) to the Honorable Nunzio J. Palladino (NRC) dated May 7, 1984, and NRC response from Nunzio J. Palladino to Stephen S. Trott, dated June 6, 1984).

The ASLB concluded: "Four cheaters have been positively identified. O and W are shift supervisors whose cheating on the April 1981 NRC operators license examination gave rise to the need to reopen the record. We find also that G and H, non-supervisory licensed reactor operators, cheated on licensee-administered requalification examinations." July 27, 1982 PID ¶2039. Additionally, the ASLAB concluded that two shift supervisors, O and W, cheated extensively on licensee-administered examinations as well as on an April 1981 NRC examination. G and H, reactor operators, cheated on licensee-administered examinations. See ALAB 772, 19 NRC ____, slip op. at 23 (May 24, 1984).

H. Shipman, a plant operating engineer, took a licensee examination and the NRC RO's and SRO's examinations in April 1981. During one of the examinations, Shipman took a break and went to the coffee machine in the hallway. He was approached by an individual who asked him the answer to an examination question, or possibly a question related to an examination question. Shipman spontaneously provided the brief answer. After the reopened hearings on cheating began, Shipman voluntarily reported the incident to H. D. Hukill, TMI-1 Vice-President, but not the identity of the questioner. The ASLAB disagreed with the Special Master's recommendation that the licensee not be permitted to use Shipman in the operation of TMI-1 until he either names the unidentified questioner or provides a credible reason why he cannot do so (Id., slip op. at 37). The ASLAB concludes that "in these circumstances, the formal reprimand is sufficient" (Id., slip op. at 40).

On a licensee-administered examination of December 19, 1980, the answers to two questions by W and GG bore similarities to such an extent that this issue became a matter of investigation. At the time of the incident, W was a shift supervisor and GG was a shift foreman. The Special Master concluded that "given the extent and nature of the similarity between answers of GG and W, the copying appears to have occurred with GG's participation" 15 NRC 918 (1982) at 93. With respect to W and GG, the ASLB concluded that GG permitted W to copy, or at least knew that he copied (July 27, 1982, PID at ¶2134). W was also the supervisor of GG, which put GG in a difficult position (Id. at 2135). The ASLB imposed no sanctions on GG (Id. at 2138). W has resigned from TMI.

C. Husted, a licensed operator instructor in April 1981, allegedly solicited an answer from P in an unproctored room during an NRC-administered examination. This was based on an interview with P by NRC inspectors on September 25, 1981. Husted denied the allegation. 15 NRC 918 (1982) at 105. On the witness stand, P denied that there had been solicitation (Id. at 104). The Special Master and the ASLB criticized the conduct of Husted during the testimony. Additionally, Husted failed to cooperate with NRC investigators who were inquiring into the overall cheating controversy. The ASLAB was advised by the licensee that Husted has been named Supervisor of Non-Licensed Operator Training. The ASLAB subsequently stated:

> We seriously question licensee's judgment in promoting Husted to an important position with management responsibilities. given his documented past failure to cooperate

> with the NRC in its cheating investigation. We therefore require, in addition to those commitments reflected in the stipulation with the Commonwealth and the conditions imposed by the Licensing Board should restart be authorized, that Husted have no supervisory responsibilities insofar as the training of non-licensed personnel is concerned. See ALAB 772, slip op. at 46.

The Special Master stated that the following clearly constituted cheating by VV:

> In early July of 1979 VV [Floyd], who was Supervisor of Operations at TMI-2, handed in to the training department a closed-book, make-up up examination comprised of four sections. . . . Of these four sections, two were written in the hand of VV [Floyd], one was written in the hand of O, and one was written partly in the hand of VV [Floyd] and partly in the hand of O. . . . The examination was to have been completed by the examinee alone. 15 NRC 918 (1982) at 135.

The training department assigned Floyd (VV) a passing grade on Section A of the examination, a section on which he had received help from O.

7.2.2.2 Certification Irregularities

Miller certified to P. Collins, Chief, Operator Licensing Branch of the NRC, in a letter dated August 3, 1979, that on retesting, Floyd had received a score of 89.1% on Section A, 80.5% on Section G and a score of 99.8% on the other two sections, E and H. The letter did not mention the incident involving O's help to Floyd (Section A was partially in O's handwriting). The ASLB concluded that the letter of August 3, 1979, which was the basis for Floyd's operator's license renewal, was a material false statement to the NRC. July 27, 1982, PID ¶2296, 2306. The ASLB recommended "that the Commission direct the staff to conduct an investigation into the circumstances surrounding the August 3, 1979, certification (Id. at ¶2312).

Floyd submitted his annual requalification examination, which was comprised of eight sections, on July 2, 1979. Two of these sections (A and H) were not entirely his own work. He had help from O. Miller was notified of this problem by J. L. Seelinger (TMI-1 Superintendent at that time). On July 3, 1979, Miller informed Herbein of the incident in a handwritten note (see B&W Ex. 796). Herbein advised Arnold of the Floyd incident, including the fact that someone else had provided some of the answers on an examination (Arnold at Dep. Tr. 450). Herbein directed Miller to conduct an investigation into the incident (Herbein at Dep. Tr. 318). A memorandum dated July 10, 1979, from R. Zechman to G. P. Miller contained a summary of events associated with Floyd's participation in the requalification program (see B&W Ex. 797). Miller advised Herbein of the results of his investigation, including recommended disciplinary action against Floyd (see B&W Ex. 798). Herbein and Miller discussed the results of the investigation and proposed disciplinary action for Floyd. Herbein knew the event was relevant to Floyd's retaining his NRC SRO's license and that Miller was preparing a letter to the NRC stating that Floyd had completed his training requirements. See Herbein at Dep. Tr. 319, 334, 335. Herbein told Miller to send a copy of the letter to the attorneys to check before sending the letter to the NRC (Id. at 335). Miller transmitted a draft on July 27, 1979, of the proposed certification letter to the NRC to E. Blake (counsel for the licensee) with a copy to Herbein and Parker. On August 3, 1979, Miller sent the recertification letter to the NRC (see B&W Ex. 799).

A letter from Miller to Arnold dated August 8, 1979, noted the proposed disciplinary action against Floyd. Arnold knew that the satisfactory participation in the requalification program was required by NRC for an operator to maintain his NRC license (Arnold at Dep. Tr. 455). Arnold did not concur with the proposed disciplinary action of suspending Floyd. Arnold insisted that the appropriate action was to remove Floyd from his position because this incident was another event in which Floyd had demonstrated poor judgment. Id. at 457. Arnold did not consider this incident an act of cheating, but characterized it as one of poor judgment on the part of Floyd (Id. at 461, 462). Herbein also characterized the Floyd incident as poor judgment on the part of Floyd (Herbein at Dep. Tr. 317). On August 20, 1979, Floyd was assigned to the GPU Accident Investigation Group. Arnold considers Floyd's reassignment to be a punitive measure; however, Floyd was never told that his reassignment was punitive (July 27, 1982, PID ¶2281). Neither Miller, Herbein, nor Arnold were asked, as part of the B&W trial, why they did not notify the NRC that O had helped Floyd on two sections of his annual requalification program examination.*

7.2.2.3 Licensee's Response to Cheating

The licensee's response to the cheating incidents was extensively litigated and is summarized in the following paragraphs. (Management's response to Floyd's cheating has been described above.)

After the NRC investigation of O and W was complete and O and W had admitted cheating, Arnold interviewed them and informed them that they were fired. Arnold then met with the operators to explain his decision to fire O and W. Hukill also met with each licensed operator, to explain in further detail management's position on cheating and to obtain comments from the operators.

The licensee reviewed weekly examinations that had not been reviewed by the NRC investigators, by searching for similarities in the answers of these examinations. Several sets of similar answers were discovered. 15 NRC 918 (1982) at 200. On the basis of these findings, Wilson, an attorney for GPUN, with the help of an associate, Lloyd, conducted the licensee's investigation. The ASLB found "that the licensee conducted an adequate investigation into the cheating incidents" (July 27, 1982, PID ¶2271).

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*By Board Notification dated June 1, 1984, and correction dated June 5, 1984, the licensee advised the Commission, ASLB, ASLAB, and parties of an additional instance of cheating by Floyd on a licensee-administered examination.

7.2.3 Staff Findings

7.2.3.1 Cheating

During the postaccident training period, cheating occurred on both licensee- and NRC-administered examinations of licensed operators. Some of the individuals culpable in these incidents held responsible management positions within TMI (i.e., Operations Shift Supervisor TMI-2, shift supervisors, and shift foreman). The licensee's after-the-fact response to these incidents was litigated and found to be satisfactory from both an investigative and employee-discipline standpoint. However, the licensee's response did not initially include an evaluation of the circumstances that resulted in poor employee attitude and lack of respect for the training program, which created, in part, the motivation for operators to cheat.

Management was clearly responsible for the testing environment that provided the opportunity to cheat and has responded with revised procedures to control and proctor examinations (Id. at 2330, 2331). Management's concern for operator attitudes and respect for the training program was the basis, in part, for initiation of the RHR study (see OI Report 1-83-013, April 16, 1984, "General Public Utilities Nuclear-Alleged Failure to Provide BETA and RHR Consultant Reports to the NRC In a More Timely Fashion," Ex. 1 at 21, Ex. 11 at 7; NUREG-0680, Supp. 4, at Section 1.1). This licensee effort to discover and subsequently improve conditions that led to a poor operator attitude toward training is commendable and should be encouraged (see 18 NRC 177 (1983) at 199; NUREG-0680 Supplement 4 at Section 4.1).

The remaining issue, which relates to management competence and integrity, is whether the incidents were of sufficient magnitude to cast doubt on the quality of implementation of the postaccident training program and more specifically management's culpability for poor implementation of the program. This issue is addressed in Section 13.0.

7.2.3.2 Certification Irregularities

The certification of Floyd's successful completion of operator requalification requirements was determined by the ALAB to be both material and false. In July 1979 the licensee discovered that the TMI-2 Supervisor of Operations (Floyd) submitted answers to questions in his annual requalification examination that were written by another operator. Miller advised Herbein, by a handwritten memorandum dated July 3, 1979, that "Floyd just handed in his overdue FSR exams," that he failed two sections, and that "one exam is not in his handwriting" (see B&W 796). Miller confirmed that he wrote the memorandum and discussed it with Herbein (Miller at Dep. Tr. 846).

Senior Met-Ed management (Miller, Zechman, et al.), at the direction of corporate management (Herbein), conducted an investigation (see B&W 797, 798) into the Floyd cheating event and recognized its relationship to Floyd's NRC license requirements (Herbein at Dep. Tr. 318, 332). Met-Ed management (Miller and Herbein) discussed the issue of Floyd's certification of completion of NRC requalification program requirements following their investigation (Id. at 319). Herbein told Miller to clear the certification letter with counsel before submitting it to the NRC (Id. at 335, 337). Miller's memorandum of July 27, 1979, to counsel highlighted the "handwriting problem" (i.e., that portions of Floyd's examination were written by another individual) and stated that this section of the examination was not being mentioned in the draft certification letter; a copy of this section was attached (Ex. 1A of Licensee's Investigation of VV and O Incident by F. Speaker, November 2, 1982). The actual certification letter was submitted to the NRC on August 3, 1979 (B&W 799). It certified the successful completion of Floyd's accelerated requalification program requirements. By letter on August 8, 1979, Miller advised Arnold the results of his investigation into the Floyd incident and recommended that Floyd be suspended. Floyd's cheating was not reported to the NRC for 2 years, when Arnold brought the matter to the attention of the NRC after an NRC investigation (July 1981, HQS-81-003) was initiated into other instances of cheating on an NRC-administered examination. As a result of the reopened proceeding on cheating, the ASLB made a recommendation that OI investigate the licensee's false material statement concerning Floyd's certification. Subsequent to the OI investigation IE concluded that a material false statement had been made and a civil penalty of $100,000 was proposed by the Director, IE.

The staff concludes that licensee management covered up Floyd's cheating and made a subsequent false certification to the NRC. The staff concludes that these acts demonstrate a deliberate disregard of management responsibilities.

The licensee's response to this event was to reassign Floyd. However, no licensee censure of Miller or licensee investigation into the involvement of Herbein, Arnold, and Blake is apparent. During depositions taken by B&W in the course of the GPU v. B&W lawsuit, Herbein and Arnold each denied seeing the July 27, 1979, draft of the certification letter. Herbein admits knowledge of the pending certification of Floyd to NRC and of directing Miller to obtain legal counsel. It is not credible that Miller would act alone given the seriousness and sensitivity upper management attributed to this issue. Testimony of the involved individuals appears to focus on the cited grade (that is, 89.1% for Section A) and the fact that this portion of the letter was not required or carefully reviewed. The implication is that this was a careless error. For the reasons discussed above, the staff finds these arguments lack merit and raise further questions about management's attitude. This event raises questions concerning management integrity, which is addressed in Section 13.0 of this report.

7.3 Current Training

7.3.1 Background

From 1976 through the time of the accident (March 28, 1979), there were several documented instances of training irregularities as discussed in Section 7.1 of this report. These instances are considered "preaccident" training irregularities. J. G. Herbein, J. J. Colitz, and G. P. Miller, all members of plant management, were involved in these training irregularities. It is clear that plant management established the real and perceived standards by which other licensed personnel then viewed the training program.

From the time of the accident through the cheating incident (postaccident training) the instances of cheating on NRC- and licensee-administered examinations reflected the attitude of examinees on the training program and on the examinations as addressed in Section 7.2 of this report.

ASLAB expressed it this way:

> The Special Master essentially concluded that although licensee's upper management did not encourage, condone, participate in, or know of the cheating at the time it occurred, it was responsible for the negative attitude among its staff toward the NRC examination process that led to the cheating and similar incidents revealed in the record. ASLAB-772 slip op. at 8.

7.3.2 Current Status

The staff has conducted numerous inspections and performed other evaluations since the cheating incident that, among other things, included the licensees' training program. During the period October 4 through 9, 1982, the staff reviewed the GPUN general employee training, the non-licensed technical training, licensed-operator requalification program, and the licensed-operator replacement training program. This review included a review of records, observation of a training session, a program review, and some personnel interviews. No violations were identified. See NRC Office of Inspection and Enforcement (IE) Report 50-289/82-19 at Sections 4.1, 4.2, and 4.3.

By letter dated January 20, 1983, from R. C. Haynes (Region I) to GPUN Corporation (Attention: R. Arnold), the NRC forwarded the results of the NRC Systematic Assessment of Licensee Performance (SALP) for October 1, 1981, through September 30, 1982. Section A, "Plant Operations," includes reports on licensed and non-licensed operator training programs. Section I, "Licensing Activities," includes reports on the significant improvement in the passing rate of the operator licensing examinations.

The TMI Instructor Evaluation Programs and the records of nine evaluations that were performed were reviewed by IE January 1 through February 4, 1983. During this period the supervisory training in administrative and technical areas and the two most recent quality assurance audits of the Training Department were reviewed. The inspection found both areas satisfactory. See IE Report 50-289/83-02 at 9, 10.

Because of issues raised during the hearing, the ASLB required that the licensee develop a training instructor indoctrination and evaluation program [see July 27, 1982, PID ¶2421(2)]. The licensee developed TMI Training Procedure 6210-ADM-2610.2, Revision 1-00, "Operating Training Instructor Indoctrination (Qualification Training Program)" in response to this ASLB requirement. In a July 28, 1983, staff SER on the subject of qualification of instructors at TMI, the staff concluded "that GPU Nuclear has developed a satisfactory program to provide indoctrination, training and certification of instructors, including continuing training and participation in applicable requalification programs."

The licensee has issued TMI Training Procedure 6210-ADM 2604.01, Revision 1-00, "Control of Examinations for Units 1 and 2," to implement a program for routine sampling and review of examination answers for evidence of cheating. The staff in a letter dated July 13, 1983, found the sampling methods, grading techniques, and review criteria intended to detect cheating were comparable to those used by NRC examiners. See IE Report 50-289/83-22 at 3.

The staff has reviewed the training program for TMI with respect to the provisions for procedural adherence at the corporate policy level and at the departmental level. The review concluded that the training on procedural adherence is acceptable. See IE Report 50-289/83-10 at Section 4.

During the period October 17 through 21, 1983, the staff conducted an inspection of the licensee's training program at TMI-1. This inspection included general employee training, non-licensed technical training, licensed operator requalification and replacement programs, and training department administration. With respect to general employee training (GET), the training program and its implementation were reviewed. The inspection included a review of records of attendance, records of training, GET examination results, and verification of retraining for individuals who had failed the examination, and interviews with several employees. With respect to non-licensed technical training, the inspection included a program review of the auxiliary operator training program description, maintenance training program description, chemistry technician training program description, and the Unit 1 Chemistry Procedure 1836, "Chemistry Technician Qualification/Training Standard," Revision 1, February 11, 1983.

The implementation of training in each of these areas also was reviewed. The administration and implementation areas of the Licensed Operator Requalification and Replacement Program were reviewed. The review of the requalification program included the program contents, review of records of six licensed operators, and interviews with two licensed operators. The interviews were conducted to determine that the training is meaningful to the participants and that training records reflect actual training. The review of the replacement operator program included a program review and inspection of the program implementation. The administrative controls governing Training Department activities were reviewed to verify the training activities were in conformance with the operating quality assurance program and hearing commitments for restart of TMI-1. The inspector reviewed the areas of the Training Department's Instructor Qualification/Certification and Evaluation Program, and the control of training department examinations. The overall conclusion of the inspection was that the program was satisfactory with no violations or deficiencies and only two open items requiring followup inspection. See IE Report 50-289/83-29.

During the period of February 13 through 17, 1984, a safeguards inspection of the licensee's Training and Qualification Plan, with respect to the Security Organization, was found to be adequate and appropriate to meet program performance requirements and objectives. See IE Report 50-289/84-04 at 5.

From February 22 through 24, 1984, an NRR team observed the TMI-1 Abnormal Transient Operating Guidelines (ATOG) Training Program held at the B&W training center in Lynchburg, Virginia. Classroom and simulator-training sessions and evaluations were observed by the team. The GPUN evaluator was M. Ross. GPUN has developed a series of complex exercises (drill packet) that present severe challenges to the shift crew and to each individual's knowledge and performance in the use of ATOG procedures. The NRR team concluded that the shift crew performed well and met or exceeded the performance level required by GPUN and exceeded the current standards of the NRC.

The NRC's most recent SALP Report is dated April 2, 1984. The assessment period for this report was October 1, 1982, through January 31, 1984. As part of the review it was concluded that "management's commitment to safety is also apparent from their extensive commitment to personnel training. . ." In the subject area of plant operations it was found that "[p]ersonnel training on the numerous restart modifications are found to be generally well developed, timely and supplemented by training briefs prepared and presented by the Operations Department." With respect to the area of radiological controls, "training for personnel is well-defined and implemented with dedicated resources." With respect to emergency planning "[a]ll levels of management have received substantial formal training in Emergency Preparedness by dedicated training personnel on the licensee's staff. . . .the training program was thorough, well implemented, and oriented toward public safety." See April 2, 1984, SALP Report, Unit 1, at 5, 12, and 20.

An Operational Readiness Evaluation of TMI-1 licensed personnel was conducted on February 8 and 9, 1984, to assess licensed operators' overall operational knowledge and understanding of reactor theory, thermodynamics, plant systems, operating and abnormal transient procedures, administrative procedures, Technical Specifications, and the emergency plan. Twenty-six licensed operators were interviewed and were found, overall, to have received adequate training and to be knowledgeable. Individual weaknesses in operators' knowledge were identified in the areas of plant systems, which is characteristic of responses expected following a period of prolonged shutdown conditions. These deficiencies are not programmatic in nature and do not reflect adversely on the quality of the current training program. Action is being taken to upgrade the operators' knowledge of plant systems. See IE Report 50-289/84-05.

The NRC by letter from H. R. Denton (NRC) to H. D. Hukill (GPUN) dated April 9, 1984, has approved Design Data Laboratories as independent consultants to perform an in-depth audit of training [see July 27, 1982 PID ¶2421 (1)].

7.4 Staff Findings

The record, as noted in Sections 7.1 and 7.2, attests to problems in training in the past that reflect on management's attitude and/or the abdication of management responsibility for the training program.

The licensee has developed new procedures and improved training programs since the cheating incident. The staff has reviewed these procedures and programs and found them to be effective. The staff will further address the implementation and effectiveness of the current training program, along with the deficiencies in preaccident and postaccident training, in Section 13.0 of this report as part of the staff's overall position on management integrity.

8.0 KEATEN REPORT

8.1 Introduction

In NUREG-1020, Section 10.2, the staff identified certain concerns that had been raised about the conduct of the licensee's internal investigation of the TMI-2 accident. The staff's analysis of several draft versions of the Keaten task force's report led the staff to refer the matter to OI for an investigation of the facts pertinent to the licensee's internal investigation and of any improper conduct in relation to the investigation and the development of the report of the investigation (the Keaten Report).

The Keaten Report was the culmination of an effort that began on the day of the TMI-2 accident, March 28, 1979. R. C. Arnold recognized after hearing of the event on March 28, 1979, that General Public Utilities Service Corporation (GPUSC) would need to assist Met-Ed in understanding the event. He set up a group of GPUSC Generation Division technical people under R. Wilson and dispatched them to the site on the afternoon of the accident. OI Keaten Ex. 17 at 9. Arnold later drafted a more specific charter for the group, which then worked on developing an understanding of the sequence of events for the accident (_Id_. at 10).

In late June 1979, Arnold thought it desirable "to look at a number of issues more specifically than they had been looked at in the course of developing the sequence of events." (OI Keaten Ex. 17 at 10). In a memorandum dated July 2, 1979, Arnold established a task force to be headed by R. W. Keaten to undertake an investigation into seven specific areas (_Id_. at 11). Those areas, as stated in B&W Ex. 338, were

1. The factors related to the trip of the main feedwater pumps including system design features, equipment malfunctions, operating procedures and practices, awareness by operators, supervision and management of system problems prior to March 28 and significant actions by the auxiliary operators prior to and subsequent to the loss of feed conditions.

2. The rationale for the control room and staff personnel response to the plant upset conditions as they did during the first few hours, including information availability, procedural considerations and exercise of authority by supervision. In particular, evaluate the circumstances that caused the operators to modulate high pressure injection when reactor coolant system pressure was abnormally low.

3. The Emergency Plan implementation, including timeliness of declaration of site and general emergencies, notifications, identification of off-site releases, and communication of plant status to appropriate management and public officials.

4. The pressurizer electromatic relief valve failure mode, including failure data from other installation and consideration of full scale testing of a prototypical valve.

5. The pathways by which radioactive fluids were transported from the Reactor Building to the Auxiliary Building, the chronology of transfer and the quantities associated with the transfers.

6. The factors leading to the incorrect status of EF-V12A and EF-V12B at [the] time of the accident, including the reasons the surveillance procedures were written so as to simultaneously isolate both trains of emergency feedwater, the practices that apparently permitted the completion of the procedure without insuring attainment of proper valve lineup, and the reasons the improper positions of the valves could apparently exist undiscovered for almost two days.

7. The adequacy of assessment by plant supervision and company management of the extent of the damage to the core, and the potential for off-site releases, including timeliness, availability and flow of information and technical accuracy.

B&W Ex. 338.

Copies of the July 2, 1979, memorandum were apparently sent to, among others, W. G. Kuhns, H. M. Dieckamp, and R. F. Wilson (Id.). At the time of his assignment to head up this task force, R. W. Keaten was Manager of Systems Engineering at GPUSC (OI Keaten Ex. 4 at 3).

The members of the task force were selected by Arnold (OI Keaten Ex. 17 at 18). In additional to R. W. Keaten, they were: R. L. Long, A. Tsaggaris, R. L. Williams, and T. L. Van Witbeck (Energy Incorporated). The task force members were assisted by a number of people. In particular, T. G. Broughton, P. S. Walsh, and E. G. Wallace participated extensively in the activities of the task force and in the preparation of the Keaten Report. OI Keaten Ex. 4 at 6-8.

Over the next several months, the Keaten task force held meetings, conducted interviews, analyzed technical data, and prepared a report on the results of its investigation. The first draft of a task force report was prepared by Keaten. This draft, dated September 28, 1979, was sent to the task force members and to some of the other people who were working with the task force. OI Keaten Ex. 4 at 12; Ex. 5 at 18. A meeting was then held at which the task force members and others "sat around a table and literally rewrote it" (OI Keaten Ex. 4 at 13). Keaten stated that the task force tried, and to the best of his memory succeeded, in achieving, in all cases, a wording to which everyone could agree (Id. at 13, 116, 187; see also OI Keaten Ex. 6 at 8; Ex. 8 at 15, 16). Keaten was responsible for accumulating suggestions and for generating revised drafts of the report (Id. at 14).

Eight versions of the task force's report were prepared between September 28, 1979 (first draft) and December 15, 1980 (final report). Table 8.1 is a chronology of significant events before and during that period. Keaten believed that the "only reports that were distributed to anyone, including Arnold, outside of those people who were directly participating in the task force activities, were versions of the report which are signed" (OI Keaten Ex. 4 at 16). Signed versions of the report were dated October 29, 1979, November 28, 1979, and December 15, 1980. According to Keaten, no member of top management received any draft before the version of October 29, 1979. Id. at 16, 190.

The version of October 29, 1979, was styled as an interim report. Keaten described one purpose of the distribution of an interim report as ". . . to see if management agrees with what our interpretation of what the charter is." By "management," Keaten explained that he meant the people who had instigated the task force activity--Arnold and Dieckamp (OI Keaten Ex. 4 at 29).

Keaten could recall having received substantive comments on drafts of the task force report from only three people who were not members of or general participants in the task force: H. M. Dieckamp, R. C. Arnold, and R. C. Seltzer of the law firm of Kaye, Scholer, Fierman, Hayes and Handler, outside counsel to GPU (Id. Ex. 4 at 21-26, 191-194). Keaten could not recall any substantive comments by W. Kuhns, P. Clark, M. Ross, R. Wilson, H. D. Hukill, I. Finfrock, or anyone associated with the board of directors of GPU (Id. at 184-190, 294).

The final Keaten Report was issued on December 15, 1980. A distribution list for the final report was compiled by Keaten, apparently based on discussions with Dieckamp and Arnold (Id. Ex. 4 at 186). The list, which appears in handwriting on the face of B&W Ex. 357, contains the following names: W. G. Kuhns, H. M. Dieckamp, W. A. Verrochi, S. Bartnoff, R. C. Arnold, P. R. Clark, R. F. Wilson, G. R. Hovey, H. D. Hukill, J. G. Herbein, R. W. Conrad, B. H. Cherry, R. L. Long, I. R. Finfrock, J. R. T. [Thorpe], A. Tsaggaris, R. Seltzer, T. L. Van Witbeck, and R. W. Keaten.

The Keaten Report was provided to the NRC as a result of a request by Commissioner Gilinsky in November 1981. The various drafts of the report were obtained as part of the record of the GPU v. B&W lawsuit.

At the staff's request, the OI investigators examined several questions that the staff had identified in relation to the Keaten Report. In a "Request for Investigation" of August 5, 1983, the staff asked OI to investigate "whether the process of review by management of the drafts of the [Keaten task force] investigators' report improperly influenced that report and, if so, who was involved in such conduct." See OI Keaten Ex. 1; see also Board Notification BN-83-117 (August 4, 1983). The specific changes in the Keaten Report drafts, which raised the issue of possible improper influence, were identified for OI by the staff in NUREG-1020LD, Section 10.2, and in a memorandum from H. R. Denton (NRR) to B. B. Hayes (OI) dated November 7, 1983. The staff's evaluation of the evidence compiled by OI on this issue is presented in Section 8.2 of this report.

As a result of the staff's review of the GPU v. B&W lawsuit documents, the staff also identified in NUREG-1020LD, Section 10.4.1, certain questions

Table 8.1 Chronology of Events

Date	Keaten Task Force Events	Other Events
March 28, 1979		TMI-2 Accident
March 29, 1979	TMI-2 Incident Review Group established by H. Dieckamp under R. Wilson (B&W Ex. 338)	
July 1979		Draft NUREG-0600 forwarded to licensee
July 2, 1979	TMI-2 Accident Review Task Force established by R. C. Arnold under R. W. Keaten (B&W Ex. 338)	
July 2, 1979		NRC issues order directing shut-down of TMI-1.
August 1979		NUREG-0600 issued by NRC
August 9, 1979		NRC issues order setting broad issues to be addressed in restart hearing (CLI-79-8)
September 28, 1979	First draft of Keaten Report (B&W Ex. 347)	
October 6, 1979	Second draft of Keaten Report (B&W Ex. 349)	
October 17, 1979	Third draft of Keaten Report (B&W Ex. 350)	
October 25, 1979		NRC issues Notice of Violation to GPU
October 29, 1979	Fourth draft of Keaten Report (B&W Ex. 351)	
October 30, 1979		President's Commission Report (Kemeny)
November 28, 1979	Fifth draft of Keaten Report (B&W Ex. 352)	
December 5, 1979		GPU responds to Notice of Violation
January 1980		Special Inquiry Group Report (Rogovin)
March 6, 1980		NRC issues order specifying management capability issues to be addressed in restart hearing (CLI-80-5)
March 24, 1980	Sixth draft of Keaten Report (B&W Ex. 354)	
March 25, 1980		GPU files suit against B&W
May 12, 1980	Seventh draft of Keaten Report (B&W Ex. 355)	
July 1980		Special Senate Investigation Report
December 12, 1980		GPU files tort claim against United States
December 15, 1980	Final Keaten Report (B&W Ex. 356)	

about the licensee's motive for not closing the power-operated relief valve (PORV) block valve and the accuracy of the licensee's response (dated December 5, 1979) to the NRC Notice of Violation regarding PORV leakage. The Commission and the parties to the restart proceeding were informed in BN-83-152 (October 3, 1983) that issues associated with this area would be explored as a part of the investigation of the Keaten Report. The specific evidence that raised these questions, as well as the particular questions of interest to the staff, was addressed in NUREG-1020LD, Section 10.4.1, and the November 7 memorandum. The staff's evaluation of the evidence compiled by OI on these issues is discussed in Section 8.3 of this report.

One of the issues that was identified by the staff in NUREG-1020LD, Section 10.2, and in the November 7 memorandum, related to possible improper conduct in connection with the input of K. P. Lucien of Energy Incorporated to the Keaten task force on the condensate and polisher systems. The staff's evaluation of the evidence compiled by OI on this issue is addressed in Section 8.4 of this report.

Another issue, identified by the staff in relation to the Keaten task force, dealt with statements by senior plant management to the Keaten task force regarding plant startup, resources, and management deficiencies. In NUREG-1020LD, Section 10.9, and in the November 7 memorandum, the staff discussed certain information that appeared to relate to one of the restart issues posed by the Commission: ". . .whether the relationship between Metropolitan Edison's corporate finance and technical departments is such as to prevent financial considerations from having an improper impact upon technical decisions." The Commission and the parties were informed in BN-83-152 that the issues associated with this area would be explored as a part of the investigation of the Keaten Report. The staff's evaluation of the evidence assembled by OI in this area is addressed in Section 8.5 of this report.

Finally, the Commission's list of integrity issues (January 20, 1984) included the question as to whether GPU provided the Keaten Report to the NRC on a timely basis. Information from OI's investigation that relates to this question is discussed in Section 8.6 of this report.

8.2 Evaluation of Changes in Draft Keaten Reports for Possible Improper Influence

8.2.1 Background

In comments on the GPU v. B&W lawsuit documents filed on July 1, 1983, intervenor Three Mile Island Alert analyzed various changes that had been made in consecutive drafts of the Keaten Report and alleged that upper management had improperly influenced the findings of the task force. After conducting its own review of the Keaten Report drafts, the staff asked OI to investigate "whether the process of review by management of the drafts of the investigators' report improperly influence that report and, if so, who was involved in such conduct." See OI Keaten Ex. 1; see also BN-83-117. The specific changes in the Keaten Report drafts that the staff believed raised an issue of possible improper influence were identified for OI by the staff in NUREG-1020LD, Section 10.2, and in a November 7, 1983, memorandum from H. R. Denton (NRR) to B. B. Hayes (OI).

8.2.2 Investigation Results

The OI investigations gathered information on the process through which the Keaten Report drafts were generated as well as on the specific changes made in the drafts (see Section 8.1, supra). As stated earlier, the evidence assembled by OI indicates that changes to the Keaten Report drafts were discussed and agreed upon by the task force (OI Keaten Ex. 4 at 13, 116). The witnesses interviewed by OI stated repeatedly and consistently that the charter of the task force was to find the facts and to report them (OI Keaten Ex. 4 at 27, 28, 120, 142, 296, 297; Ex. 7 at 39; Ex. 8 at 44, 47) and that the task force was not pressured to make particular findings or changes in the report (OI Keaten Ex. 4 at 193, 194, 296; Ex. 5 at 82, 109; Ex. 8 at 17; Ex. 16 at 180). Dieckamp was identified as the source of the "tell it like it is, just make sure that it's right approach" (OI Keaten Ex. 7 at 53). Keaten stated that he was instructed by Dieckamp "to make sure that the report reflected the views of the task force and nobody else" (OI Keaten Ex. 4 at 115, 116, 193, 194). He praised Dieckamp and Arnold for making it easy to carry out the investigation and to report the facts as the task force found them (OI Keaten Ex. 4 at 194, 300).

While substantive comments on certain drafts of the report were received from specific members of management (Dieckamp, Arnold) and from counsel for GPU in the GPU v. B&W litigation (R. Seltzer), R. W. Keaten denied that any change to the report had been made or information excluded in order to put management in a better light (OI Keaten Ex. 4 at 296, 297). According to Keaten, the task force was "repeatedly told not to make any changes to the report that we did not think were correct and accurately represented the opinions of the task force . . . ." (OI Keaten Ex. 4 at 296). He stated that the task force did not dilute or delete any criticisms of management that the task force considered factual and accurate (Id. at 286).

In its report on the results of its investigation, OI grouped the changes identified by the staff into eight separate areas. The same groupings are retained in the discussion of investigation results that follows (OI Keaten at 9).

(1) Changes in the Task Force Reports Relating to the Davis-Besse Incident and Previous Experiences at TMI-1

Several changes in the drafts to the Keaten Report relate either to the Davis-Besse incident or to previous experiences at TMI. Between the drafts of October 29 and November 28, 1979, a new section entitled "Effect of the Leak Location" was added to the discussion of the rationale to the responses of the control room and staff personnel. This new section then remains essentially unchanged through the final report of December 15, 1980. See OI Keaten at 15 (full text of the added section). Also between the drafts of October 29 and November 28, 1979, the following sentence is deleted from the second paragraph of the section entitled, "Knowledge of Relevant Previous Events": "There was a similar lack of emphasis in learning from previous TMI-1 events resulting in a burst rupture disc on the [reactor coolant drain tank]." Between the drafts of November 29, 1979, and March 24, 1980, a new sentence was added to the first paragraph of this section stating that "the technical staff of the NSSS vendor reviewed this transient [Davis-Besse] and recognized its significance, but this information was not disseminated to other users." Finally, in the second paragraph of this section, the thought that if certain specific actions had been taken by the licensee "the operators might have had sufficient information to recognize the stuck valve" was changed between November 28, 1979, and March 24, 1980, to "the need for improved means for identifying a stuck open PORV might have been recognized."

In its memorandum of November 7, 1983, to OI, the staff stated that these changes appeared to represent a shifting of responsibility for the accident from the licensee to B&W. OI's investigation pursued the bases for these changes.

OI's investigation resulted in a conclusion that certain of the changes discussed above were influenced by GPU upper management (H. M. Dieckamp) and "possibly" by GPU's outside counsel (R. Seltzer) in the GPU v. B&W litigation.

The added section on the "Effect of the Leak Location" was introduced by Keaten with the unanimous agreement of the task force members as a result of a conversation he had with Dieckamp after the latter had reviewed an earlier draft of the report. According to Keaten, Dieckamp commented that the effect of the leak location had a significance that "didn't come out" in the draft report as it had in previous discussions between Keaten and Dieckamp. OI Keaten Ex. 4 at 98-100. Dieckamp recalled about this change that the first draft he saw did not "adequately reflect the unanticipated behavior of the plant during the accident. . ." (OI Keaten Ex. 16 at 63, 64). Keaten stated that he considered Dieckamp's comment valid. Keaten discussed it with the task force and wrote up the new section. It was included in the report after "[e]veryone there unanimously agreed that it was an improvement." OI Keaten Ex. 4 at 99, 100.

With respect to the deletion of the sentence concerning a "lack of emphasis in learning from previous TMI-1 events resulting in a burst rupture disc on the RCDT," no witness had a specific recollection as to the reason for the change. Keaten could not recall "anyone outside the task force ever commenting on that sentence" and he believed "it was strictly a decision by the task force to take it out." OI Keaten Ex. 4 at 109. Keaten recalled that the report already commented about the failure to use available information and that the specific incident in question was not really analogous to the accident of March 28, 1979 (Id. at 108-109).

As noted above, a new sentence was added in the draft of March 24, 1980, in the section on "Knowledge of Relevant Previous Events" that stated B&W had reviewed the Davis-Besse transient, but failed to disseminate the information to other users. The importance of the Davis-Besse incident was discussed with Keaten by Dieckamp and also by R. Seltzer.

Dieckamp acknowledged that he had discussed this portion of the report with Keaten (OI Keaten Ex. 16 at 63, 77). Dieckamp considered the Davis-Besse incident and its relationship to operator training and operator action "an important learning" and did not believe that it was inappropriate for him to assure that the Keaten Report included a discussion of the significance of Davis-Besse (Id. at 77).

Seltzer also emphasized the need "to focus clear[ly]" on the Davis-Besse event during a meeting he had with Keaten (OI Keaten Ex. 4 at 24). Keaten believed from a review of his appointment book that this meeting occurred on March 11, 1980 (Id. at 117-119). Keaten could not recall whether any particular changes in the report were made as a result of this comment by Seltzer, although he stated that it was "quite possible that we did discuss that item and discussed adding it to the report" (Id. at 225-226). The fact that this sentence first appeared in the March 24, 1980, draft of the report would tend to support this scenario.

The final change in this area concerned the possibility that a fuller analysis of a previous TMI transient could have assisted the operators on the day of the TMI-2 accident. Specifically, the phrase "the operators might have had sufficient information to recognize the stuck valve" was changed between November 28, 1979, and March 24, 1980, to "the need for improved means for identifying a stuck open PORV might have been recognized." Keaten could not recall who initiated this change. He did remember that there was a lot of discussion within the task force about the specific wording in this section because this was perceived "to be a very important section of the report" (Id. at 106).

(2) Changes in the Task Force Report Made Under the Subheading of "System Design Features"

In the draft report of November 28, 1979, the first paragraph of the section entitled "System Design Features" contains the statement that "[f]urther investigation is in progress" of problems with the condensate and feedwater systems. In the March 24, 1980, draft and later drafts, this sentence does not appear. In the memorandum of November 7, 1983, the staff identified the relevant questions as to whether management review resulted in any further investigation being halted and why or, if not, whether such an investigation was conducted and with what results.

The investigation by OI elicited information that the "further investigation," referred to above, was conducted. This work was characterized by Lucien as the performance of hardware inspections and the obtaining of test results. This followup work was conducted by Saunders of Energy Incorporated, after Lucien departed TMI for a new assignment on or about September 1, 1979. Lucien later incorporated information on the followup work into a subsequent draft of his report dated April 17, 1981. OI Keaten at 18; OI Keaten Ex. 42 at 2-3. See Sections 8.4 and 9, infra.

(3) Changes in the Task Force Report Made Under the Subheading of "Awareness of System Problems"

In the draft report of November 28, 1979, the second paragraph contains the statement that "[t]he task force plans additional investigation to clarify this situation" in reference to operators' suggestions for improvements vanishing into the system without feedback. In the March 24, 1980, draft and subsequent drafts, this sentence is deleted. In the November 7 memorandum, the staff asked whether management review had resulted in this additional investigation being terminated and why or, if not, whether such an investigation was conducted and with what results.

R. W. Keaten told OI that further investigation was conducted in this area. The task force talked to other people "to understand the suggestion system that was used, and what the problems were" (OI Keaten Ex. 4 at 136). They discovered that operators who made suggestions through the formal system were not getting timely feedback on the action taken, if any, and that many operators did not document their suggestions. As a result of this further investigation, the task force included in the final report "a very specific recommendation for a very easy-to-use system for working requests or suggestions with a guarantee that the user would get feedback." Id. Ex. 4 at 136, 143-144. In sum, the task force completed the additional investigation it considered necessary and made the decision itself not to pursue the matter further (Id. at 136-137).

(4) Changes in the Task Force Report Made Under the Subheading "Operator Training"

Two significant changes occurred in the section entitled "Operator Training." In the draft of March 24, 1980, the eighth paragraph of this section referred to the need for further investigation of "the adequacy of training resources, the need to expand the program to cover more of the plant staff, and special training needs for other members of the organization." In the draft of May 12, 1980, a sentence was added that states "[t]his investigation was deemed to fall outside the scope of the Task Force activities, and is being pursued by others." The "Roddis Report" is newly referenced in this draft. The staff's November 7 memorandum asked why and by whom was responsibility for further investigation in this area transferred from the Keaten task force to Roddis, what significance is there to the fact that the final report refers to an investigation that "is being pursued" but references a report dated 11 months earlier, who was Roddis, what did he investigate and what were his conclusions?

The second change in this section was the deletion of the seventh paragraph, which discussed new symptom-oriented procedures, between the draft of May 12, 1980, and the final report of December 15, 1980. A handwritten note in the margin of the March 24, 1980, draft recommends this deletion. In the November 7 memorandum, the staff identified questions, among others, about the author of the note and the reason for the decision.

OI elicited no information that further investigation in the training area was terminated as a result of management review of the Keaten Report draft. Keaten noted that "substantial aspects" of the task force report dealt with training. To go further than the task force had gone would have required substantial additional resources. In Keaten's words, "it was the decision of the task force that it was unnecessary for us to do it because these activities were already underway." He referred to three studies on training and pointed out that the Roddis Report was cited only as an example of the work being done outside the task force. OI Keaten Ex. 4 at 233-34; see also B&W Ex. 356 at 39. T. G. Broughton, a general participant to the task force activities, also worked closely with the Roddis committee (OI Keaten Ex. 4 at 235). To the best of Keaten's memory, the decision not to pursue the investigation of training issues further was not by direction of upper management (Id. at 236). Similar accounts were given by Van Witbeck, Tsaggaris, and Long (see OI Keaten at 21).

Keaten said that the task force was aware that the Roddis Report had been issued and cited it only as an example of the work that was going on outside the task force. It was cited specifically because "there was a report on the street that we could reference." OI Keaten Ex. 4 at 234.

The Roddis Report ("Report of Ad-Hoc Advisory Committees as Personnel Selection and Training, Man-Machine Interface and Communications," January 1980) was obtained from GPU by OI and was reviewed by the staff. As a result of its review, the staff found no new information and/or new insights into the actions of individuals or systems in the general time frame of the TMI-2 accident. See OI Keaten Ex. 21.

(5) Changes in the Task Force Report Related to EFV-12A and B

Between the draft reports of October 29 and November 28, 1979, in the section on "Factors Leading to the Incorrect Status of EFV-12A and B," a statement that operating with the emergency feedwater valves closed was a violation of plant operating procedures and Technical Specifications is deleted. A similar statement in the second paragraph is made less clear. Instead, the task force report blames the procedures and Technical Specifications for a lack of clarity. The subheading "Surveillance Procedure" within this section is completely rewritten between the same two drafts. A different interpretation is given of the TS requirement and the conclusion that the Technical Specifications were violated is removed. Also, the statement that the "task force investigation into how these types of violations could occur in spite of the supposedly extensive review that surveillance procedures received has not yet been completed" is deleted. In its November 7 memorandum, the staff characterized these changes as "extremely significant" and asked who suggested them, when, and why.

The staff considered these changes significant because of the fact that the changes in the drafts of the Keaten Report made the report consistent with the position taken by Met-Ed in its response of December 5, 1979, to the Notice of Violation (NOV) of October 25, 1979.

Keaten confirmed that there was a connection between the changes and Met-Ed's response to the NOV. One of the general participants in the activities of the task force was E. Wallace; Wallace also had primary responsibility for drafting Met-Ed's response to the NOV. OI Keaten Ex. 19 at 9.

E. Wallace examined the licensing basis for the emergency feedwater system. Working with an attorney (J. Silberg) and an engineering consultant (E. Fuller), Wallace developed a response to this section of the NOV that took what Arnold described as a "very narrow legal interpretation" of the requirement in the Technical Specifications and concluded that the Technical Specifications had not been violated. OI Keaten Ex. 19 at 10, 153. This response was reviewed by Arnold and by

Dieckamp (OI Keaten Ex. 17 at 80; Ex. 16 at 129). The formal response to the NOV was signed by Arnold.

Keaten believed that Wallace had brought to the attention of the task force the argument being prepared for the response to the NOV. After reviewing the TS requirement itself more carefully, the task force concluded that the TS requirement was ambiguous and may not have been violated. OI Keaten Ex. 4 at 245-248; Ex. 19 at 134-135. It was clear to the task force, however, that the intent of the Technical Specifications was violated and the report was changed to reflect this conclusion (OI Keaten Ex. 4 at 242, 245, 246). Keaten stated that the task force arrived at an independent conclusion about the TS requirement rather than simply accepting the conclusion prepared for the response to the NOV (Id. at 247, 248). Wallace confirmed that he was the person who had convinced the task force members that the procedure in question was not a literal violation of the Technical Specifications (OI Keaten Ex. 19 at 154).

Keaten could not recall any comments by Arnold or Dieckamp on this section, although he thought it probable that he had discussed this subject matter with them (OI Keaten Ex. 4 at 256). Keaten, Long, and Arnold all denied that there was any attempt to dictate the contents of the task force report because of positions taken in responding to the NOV (Id. at 248, 249; Ex. 5 at 100, 101; Ex. 17 at 81).

(6) Changes in the "Conclusion" Section of the Task Force Report

Several changes are made in the "Conclusion" section of the Keaten Report drafts between the October 29, 1979, the November 28, 1979, and the March 24, 1980, versions of the report. The most significant change is the elimination, in the draft of March 24, 1980, of a conclusion that "the general operational condition appears to indicate a lack of management awareness of problems, an insufficiently stringent standard by which to evaluate operations, and/or a management philosophy which accepted this situation, at least in the short run." Instead, the draft of March 24, 1980, contains a statement that "the task force did not perform a thorough review of the role played by TMI management relative to the identified problems. . . . " The staff asked in the memorandum of November 7, 1983, at whose instance this change was made, why, and what were the circumstances.

OI concluded that its investigations "did not produce any testimony or documentary evidence linking this change in the draft reports to comments or actions by GPU upper management" (OI Keaten at 29). Keaten stated that the task force did not undertake a thorough review of the role of management in relation to the problems that had been identified because the management structure had changed so significantly.

> So the task force members felt that with this total restructuring and with the tremendous addition of personnel, management level personnel and financial resources to the plants . . . to explore further what had been the problems from a management standpoint

> back prior to the accident was really just wasted motion.
>
> OI Keaten Ex. 4 at 261-262.

A similar statement was made by T. L. Van Witbeck, who recalled that the conclusion in the earlier draft was "what we felt was the case" but was not sufficiently substantiated. To get such substantiation, he said, would have required more time and resources than the task force had. OI Keaten Ex. 7 at 72, 73.

(7) Change in the "Recommendation" Section of the Task Force Report

Between the drafts of November 28, 1979, and March 24, 1980, the last sentence of the second item in the "General Recommendations" subsection is deleted. The sentence reads: "The standards and practices which led to deficiencies such as those uncovered in this investigation must be eliminated." In its November 7 memorandum, the staff asked at whose instance the deletion was made and why.

OI concluded from its investigation that "[n]o evidence was developed which indicated that this deletion was influenced by GPU/Met-Ed upper management" (OI Keaten at 30). Keaten had a recollection (about this deletion) that one or more members of the task force group felt that "the statement was a little bit too emotional in nature and didn't really add anything to the recommendation" (OI Keaten Ex. 4 at 284).

(8) Changes in the Task Force Report Regarding the PORV

A number of changes in the Keaten Report drafts relate to leakage from the pressurizer and violation of an emergency procedure regarding pressurizer system failure. In the draft of March 24, 1980, subsection "Previous Experience" in the section on "The Rationale for the Control Room and Staff Personnel Response," the statement appears in the third paragraph that "[a]t TMI, leaking pressurizer relief valves produced elevated discharge pipe temperatures before the event."

In the draft of May 12, 1980, the reference is changed to "leaking pressurizer safety valves." In the subsection "Use of Procedures" in the same section, the fifth paragraph changes between the drafts of October 29 and November 28, 1979. After a sentence stating that "[o]ne symptom of a leak was an indicated tailpipe temperature above 130°F," the statement that "[t]he plant had operated in violation of this requirement for an extended period prior to the accident" is changed to "[t]he plant had operated with higher discharge pipe temperatures for an extended period prior to the accident." This paragraph also contains the statement that operation in this mode without closing the block valve "was a conscious decision by the plant management." In the draft of May 12, 1980, this entire paragraph is deleted.

Additional changes appear in the section on "The Pressurizer Relief Valve Failure Mode." Between the drafts of November 28, 1979, and March 24, 1980, several references to planned or ongoing efforts to get additional information on the PORV and possible failure modes are deleted, including a statement that the task force's efforts in this area had "been encumbered by an inadequate availability of documents concerning the valve history." In the final report of December 15, 1980, this section is completely rewritten and new references are added to recently completed reports by Met-Ed. The most significant change is the statement that "more thorough investigation" had shown that one of the code safety valves, rather than the PORV, was leaking and caused the elevated tailpipe temperatures.

In the November 7 memorandum, the staff asked who suggested these changes, when, and why. The staff noted a possible relationship between these changes and the positions taken by Met-Ed in its December 5, 1979, response to the NOV.

OI's investigation confirmed that there was a relationship between these changes and the Met-Ed response to the NOV. Keaten stated that the changes in this area were made primarily as a result of information brought to the attention of the task force by E. Wallace, who was preparing Met-Ed's response to the NOV. According to Keaten, Wallace "kept the task force informed of the results of this additional work that was done." OI Keaten Ex. 4 at 149. Among the information provided by Wallace was information that the control room operators had made a determination that one of the code safety valves was leaking and the PORV was not leaking. The task force did not review the documents supporting Wallace's findings: "We simply took his findings and used them" (Id. at 160). Both Wallace and Van Witbeck corroborated Keaten's account (OI Keaten Ex. 19 at 54-68, 84-86; Ex. 7 at 24-38). See Section 8.3 (concerning the accuracy and completeness of the information provided by Wallace).

8.2.3 Staff Findings on Changes in the Keaten Report Drafts

The issue identified by the staff in the memorandum of August 5, 1983, from W. J. Dircks (EDO) to B. B. Hayes (OI) was whether the process of review of the drafts of the Keaten Report by management resulted in a final product that was improperly influenced by management so as to reflect better on the licensee than would otherwise have been the case. The staff focused its inquiry on the October 29, 1979, draft and subsequent drafts because the evidence indicated that there had been no review by management of any drafts before that date. The specific changes in which the staff was interested were identified in NUREG-1020LD, Sections 10.2 and 10.4.1, and in the November 7 memorandum.

OI's investigation produced evidence that the only management officials who reviewed and provided substantive comments on the drafts of the Keaten Report were Dieckamp and Arnold (see OI Keaten Ex. 4 at 11-12, 26, 191-194, 285, 286). Dieckamp commented specifically on the Keaten Report sections concerning the effect of the leak location on operator response, the Davis-Besse incident, and operator training (Id. at 92; OI Keaten Ex. 16 at 61, 121). Arnold's comments were not identified as having related to any specific section, but it was clear that he had provided substantive comments on certain Keaten Report drafts (OI Keaten Ex. 4 at 285, 286). An attorney (R. Seltzer), retained by the licensee in connection with its suit against B&W, also provided substantive comments on at least one draft of the Keaten Report. These comments related to the Davis-Besse incident and to contractual liability issues. Id. at 21-25, 279-283.

While other management officials were aware of the ongoing work of the task force (W. G. Kuhns, P. Clark), they did not provide substantive comments to the task force on the draft reports (see Id. at 16-17, 189-191, 294; OI Keaten Ex. 14 at 20-23, 27, 39, 71-73, 108-110; Ex. 18 at 9-10). Still other management officials presently associated with TMI-1 appear to have had no involvement with the Keaten task force reports (e.g., M. Ross, R. Wilson, H. Hukill) (see OI Keaten Ex. 4 at 184-186). The only other individual whom Keaten could recall as having reviewed and commented on the report was W. Lowe of Pickard, Lowe and Garick. Lowe reviewed and commented on the report at Keaten's request. Id. at 188, 189.

The evidence compiled by OI demonstrates the comments provided by H. M. Dieckamp and R. Seltzer did have the effect of influencing certain portions of the Keaten Report. The staff finds no basis in the record assembled by OI; however, to conclude that the influence that the comments by Dieckamp and Seltzer had improper influence on the Keaten Report. The statements by the task force members in which they were instructed not to include anything in the report that their findings did not support, stand uncontradicted. The specific comments by Dieckamp and Seltzer were discussed by the task force members and the changes that resulted were unanimously agreed upon.

The evidence compiled by OI also demonstrates that the content of the Keaten Report was influenced by information provided by Wallace as a result of his assignment to prepare Met-Ed's response to the NOV. In the case of changes to the section on "Factors Leading to the Incorrect Status of EFV-12A and B," the task force evaluated the requirement of the Technical Specifications in light of the information provided by Wallace, concluded that the TS requirement was ambiguous, and changed the report to reflect a conclusion that the intent (rather than the letter) of the TS requirement had been violated. In the case of changes to the report in relation to the PORV, the task force did not conduct an independent assessment but accepted at face value the findings represented to the task force by Wallace. The staff is aware of no evidence that either Wallace or the Keaten task force was under instructions from licensee management officials to conform the Keaten Report to Met-Ed's response to the NOV.

On the basis of the staff's review of the GPU v. B&W record and the evidence compiled by OI during its investigation, the staff concludes that the process of review of the drafts of the Keaten Report by management did not result in a final product that was improperly influenced to reflect better on the licensee than would otherwise have been the case. As detailed above, changes were made to the Keaten Report that, in some cases, resulted in a final report that reflected more favorably on the licensee. In certain specific instances (for example, changes in the task force report regarding the PORV) changes were made that were contrary to facts in the possession of the task force. The evidence does not support a conclusion, however, that such changes were the result of any influence on the task force by management.

8.3 Accuracy of Information Contained in Met-Ed's Response to the October 25, 1979, Notice of Violation

8.3.1 Background

A condition that existed at TMI-2 before the accident was leakage from the pressurizer to the drain tank either through the PORV or the code safety valves. The question of whether the licensee believed the leakage was a result of a defective PORV or a defective code safety valve was argued during the GPU v. B&W trial as it related to the appropriateness of the licensee's response to the leakage. After the accident, the licensee paid a civil penalty of $155,000 based, in part, on not having followed procedures concerning closure of the PORV block valve. On the basis of its review of the lawsuit documents, the staff stated in NUREG-1020LD, Section 10.4.1, that the lawsuit documents provide evidence that different views on the source of the leakage and reasons for not closing the PORV block valve were stated by various individuals and groups within the licensee's organization at different times both before and after the accident.

The staff's review of the evidence available led it to refer the following issue for evaluation by OI: whether any false information was provided in the licensee's December 5, 1979, response to the NRC's October 25, 1979, Notice of Violation (NOV) concerning the licensee's failure to follow procedures, in light of the fact that the Keaten task force draft reports being circulated internally to upper management at the time of the licensee's response contained information in conflict with the licensee's response to the NOV. See NUREG-1020LD, Section 10.4.1. OI examined this issue as a part of its investigation of the Keaten Report.

8.3.2 Investigation Results

OI's investigation focused on two specific areas of the licensee's response to the NOV. In responding to Section 4A of the NOV concerning closure of the PORV block valve, the licensee stated:

> Although this procedure was understood by the plant staff, it is not clearly written and does not reflect actual plant conditions. It will be changed. However, although Metropolitan Edison is concerned about the issue, there is no indication that this procedure or the history of PORV discharge line temperatures delayed recognition that the PORV had stuck open during the course of the accident. OI Keaten Ex. 22 at 34.

As requested by the staff's November 7 memorandum, OI examined the accuracy of the licensee's assertion that "there is no indication that this procedure or the history of PORV discharge line temperatures delayed recognition that the PORV had stuck open during the course of the accident." OI also examined the accuracy of that portion of licensee's response to the NOV that asserted that elevated relief valve discharge line temperatures "do not appear to have been the result of a leaking PORV" but rather were related to a leaking code safety relief valve. See Id. at 35, 36.

8.3.2.1 Delayed Recognition

OI found that Wallace had the lead responsibility in developing the licensee's response to the NOV. Wallace reported to Arnold in preparing a response for the latter's signature. OI Keaten at 37. OI concluded from its investigation as follows:

> The testimony obtained during this investigation established that Met Ed's statement in their response to the NOV that . . . there is no indication that this procedure or the history of PORV discharge line temperatures delayed recognition that the PORV had stuck open during the course of the accident was contrary to information in their possession in the form of internal investigations and interviews under the supervisory control and/or cognizance of ARNOLD and WALLACE. Id. at 46.

The contrary information referred to by OI is detailed in its report. W. Zewe gave testimony before the President's Commission on the Accident at TMI that the relief valve temperatures had "always been greater than 130 degrees" because of known leakage through the PORV or a code safety valve. Internal investigative documents at GPU stated that "the temperature downstream of the primary relief valves was not considered to be abnormal since there was known leakage from the valves" causing elevated tailpipe temperatures and that "little significance was attributed to" a downstream tailpipe temperature of 230°F for this reason. These GPU documents suggested that operators may have become "desensitized" to abnormal conditions due in part to "high discharge pipe temperatures before the event." Deposition testimony by T. G. Broughton in the GPU v. B&W lawsuit explained that at least one operator had indicated after the accident that "his interpretation of the temperature downstream of the relief valve following the trip was that it was similar to the temperature which had existed downstream of the relief valve before the trip." Van Witbeck and Long both recalled that the shift supervisor (W. Zewe) had been influenced in diagnosing the significance of the elevated tailpipe by the fact that high temperatures were normal. OI Keaten at 38-42.

Wallace maintained that he had relied "very heavily" on statements made soon after the accident. OI Keaten Ex. 19 at 118-119. However, internal Met-Ed interviews with Zewe, shortly after the accident, show that Zewe was not alerted to trouble by the discharge pipe temperatures on March 28, 1979, because these temperatures had been running at around 190°F and the PORV had recently lifted. [When Zewe was interviewed by OI, he could not recall whether the high PORV discharge line temperatures delayed his recognition of the stuck-open PORV (OI Keaten Ex. 27 at 16).]

8.3.2.2 PORV Versus Code Safety Valve Leakage

One reason given in Met-Ed's response to the NOV for why Emergency Procedure 2202-1.5 had not been violated, in the licensee's view, was that the elevated relief valve discharge line temperatures were caused by a leaking code safety valve rather than the PORV. OI's investigation report states that Wallace's conclusions, ". . . do not appear to be supported by the weight of the facts nor do they appear to be technically valid." OI further concluded that Met-Ed's argument "was contradictory to other important information that was in the possession of Met-Ed at the time the response was signed." OI Keaten at 60.

OI investigators examined each of the four bases cited by Wallace in support of his conclusion that leakage before the accident was known to be through a code safety valve rather than the PORV: (1) TMI-2 plan-of-the-day (POD) meeting computer printouts, (2) a TMI-2 work request to repair code safety valve RCRV-1A, (3) the multipoint strip recorder and (4) interviews of plant staff.

As to the POD meeting computer printouts, OI found that certain POD annotations referred to by Wallace do indicate the author felt that the code safety valve was leaking. These printouts, however, contain no information to indicate that the PORV was not leaking.

As to the work request for code safety valve RCRV-1A, the investigation confirmed that such a request had been prepared by E. Showalter. However, Showalter denied any first-hand knowledge that the code safety valve was leaking; he could not recall why he had initiated the work request.

Other evidence showed that the initiation of a work request may have been used at TMI-2 to determine the availability of a code safety valve. OI Keaten at 50. Therefore, the mere fact that a work request was prepared for the code safety valve does not necessarily mean that a determination had been made that a code safety valve was leaking.

As to the multipoint strip recorder, OI found that Wallace had no first-hand knowledge that anyone used the multipoint strip recorder to determine the source of pressurizer system leakage before the accident. J. M. Stubbs used data on upstream temperatures _after_ the accident to conclude that one or both code safety valves were leaking and that the PORV was not leaking. The only individual known to have claimed that a preaccident determination had been made that a code safety valve was leaking and the PORV was not leaking was R. Sieglitz, Supervisor of Maintenance TMI-2. Sieglitz's testimony during the _GPU v. B&W_ trial, based on _downstream_ thermocouple temperatures, is not credible. The evidence (_i.e._, TDR-126* and NRR's analysis of TDR-126) showed that one cannot determine from downstream thermocouple temperatures alone which valve is leaking. OI Keaten at 54.

As to interviews with plant staff as a basis for the response to the NOV, OI found that G. P. Miller, former TMI Station Manager, W. Zewe, former TMI-2 Shift Supervisor, C. Faust, former TMI-2 Control Room Operator, and E. Frederick, former TMI-2 Control Room Operator, all thought that the PORV was leaking. The following excerpt from a transcription of a May 25, 1979, meeting (B&W Ex. 761 at 10) clearly indicates management's prior involvement in the decision to not follow the emergency procedure.

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*TDR-126, "Investigation of TMI-2 Pressurizer PORV Discharge Pipe Temperature," February 28, 1980 (B&W Ex. 428) and NRR's technical evaluation of TDR-126 dated October 12, 1983.

MILLER: I want to discuss when we would shut that block valve on the electromatic and looking at the pressurizer system failure procedures, it says that we would shut it when, what, we had a leaking valve or an inoperable electromatic. Now, how do we authorize operating with a valve that is leaking in accordance with our procedure?

ZEWE: Says if the pressurizer boron concentration is changed.

MILLER: Symptoms of a leaking valve are given there. We knew the valve was leaking, I thought.

ZEWE: Oh yes.

Miller: It has nothing to do with this transient. This is what was brought up to me in the thing on Thursday, and that was that you have a procedure that says shut the valve when you have a problem with it. I explained that as not being one of the procedures that we had to follow that day, and in fact we were in the other procedures like I described earlier. Management-wise though we were operating the plant with this valve known to be leaking not using this procedure.

PORTER: Electromatic or code?

MILLER: Electromatic.

PORTER: We know that was leaking?

MILLER: I think we thought it was, whether we were right or wrong.

SEELINGER: Because of those 180, 190 degree temperatures?

MILLER: That's right. Let that go right there.

J. Logan, former plant manager, also gave testimony to the Kemeny Commission that there was leakage in one of the pressurizer relief valves but that he did not know which one of these valves (PORV and two code safety valves) was leaking. Wallace was unable to name anyone who had concluded that the PORV was not leaking. OI Keaten Ex. 19 at 45. He recalled that this conclusion was based on information provided by Stubbs. Stubbs, however, told OI that he did not recall talking to anyone who thought the PORV was not leaking and that he did not provide Wallace or anyone else with information from which such a conclusion could be drawn. OI Keaten at 57.

8.3.3 Staff Findings

As discussed above, the staff's review of the GPU v. B&W lawsuit documents led it to refer to OI questions concerning whether the licensee willfully violated Emergency Procedure 2202-1.5 and whether any false information was provided by the licensee in the licensee's response to Section 4A of the NOV. The staff concludes that the licensee did willfully violate the pertinent emergency procedure and that statements were made by the licensee in its response to the NOV that were neither accurate nor complete and that were contrary to other information in the possession of the licensee.

In its response to the NOV, the licensee stated that the elevated relief valve discharge line temperatures were caused by a leaking code safety valve rather than the PORV and implied that a determination to this effect had been made before the accident. Thus, the licensee argued, there was no violation of Emergency Procedure 2202-1.5.

The staff finds that the weight of the available evidence contradicts this position. Plant personnel, with only one identified exception, thought that the PORV was leaking or did not know which of the pressurizer valves was leaking. Wallace was unable to name anyone who had concluded that the PORV was not leaking. While Sieglitz claimed during testimony at the GPU v. B&W trial that such a preaccident determination had been made, this claim is not credible. Moreover, to the extent Sieglitz had made such a determination, he stated that he did not convey this information to anyone in operations nor to his supervisor, D. Shovlin. The only technical analysis of pressurizer leakage is postaccident and does not establish that the PORV was not leaking. Stubbs, who conducted this analysis, told OI that he did not recall talking to anyone who thought the PORV was not leaking before the accident and that he did not provide Wallace, or anyone else, with information from which such a conclusion could be drawn.

In the absence of convincing evidence that the licensee had determined before the accident that the PORV was not leaking and the statements by the Station Manager that they chose not to follow the procedure, the staff concludes that the licensee made a willful decision to violate Emergency Procedure 2202-1.5. Statements to this effect were made by plant operations personnel. See NUREG-1020LD, Section 10.4.1. The PORV block valve was not closed despite the presence of all of the symptoms detailed in the emergency procedure. In sum, plant personnel thought that the PORV was or might be leaking, saw symptoms that called for closure of the block valve to determine whether the PORV was leaking, and decided not to follow the procedure.

The licensee also stated in its response to the NOV that there is "no indication that this procedure or the history of the PORV discharge line temperatures delayed recognition that the PORV had stuck open during the course of the accident." The staff's review of the lawsuit documents led it to call into question the validity of this statement.

The staff had disagreed with this statement by the licensee when first made. In Appendix A to a January 23, 1980, letter (which transmitted the order imposing the proposed civil penalty) from the Director of the Office of Inspection and Enforcement to R. C. Arnold of Met-Ed, the staff stated:

> The licensee also asserts that there is no indication that this procedure or the history of pilot-operated (electromatic) relief valve [PORV] discharge line temperature delayed recognition that the PORV had stuck open during the course of the accident. Shutting the relief isolation valve early in the accident could have prevented the accident entirely, reducing it to an operational transient. There is a clear indication that recognition of an open PORV was delayed in part by the past history of the discharge line temperature in that the Emergency Procedure had not been implemented. Much of the response of the licensee addressed those many valid technical reasons which should have prompted a review and revision to the applicable emergency procedure to make it appropriate to the existing plant conditions. Those revisions were not made, and therefore, the procedure was ignored rather than implemented.

The lawsuit documents and OI's investigation provided evidence that the licensee's statement was also at variance with information in the possession of the licensee at the time the statement was made. Specifically, the licensee knew, or should have known, of the following at the time it filed its response to the NOV:

(1) W. Zewe's statement on March 30, 1979, that the relief valve discharge temperatures "didn't look abnormally high" at 228 to 230°F because "they had been running at 170 to 180 [°F] so I figured it was still warm from when it lifted"

(2) a similar statement by W. Zewe on April 6, 1979, to a GPUSC investigative group

(3) Zewe's testimony before the Kemeny Commission on May 30, 1979, that he did not close the PORV block valve despite the elevated PORV discharge temperature because leakage past the PORV or a code relief valve had caused the "normal" temperature to be elevated to 175 to 190°F

(4) the statement in TDR-054 (at 7) that "little significance was attributed" to the elevated discharge line temperature because it had run "near 200°F prior to the transient"

(5) a second statement in TDR-054 (at 14) that operators may have become "desensitized" to abnormal conditions due, in part, to high discharge pipe temperatures caused by leaking pressurizer relief valves before the event

(6) a nearly identical statement as that to item 5 in the October 29, 1979, draft of the Keaten task force report

Wallace justified his conclusion that operators were not desensitized by elevated relief valve discharge line temperatures as follows:

> Even if the valve had been 130 degrees normally, the impression I have is he still would have felt that was

> just the piping system response to a valve that had opened and reclosed, rather than one that had stuck open. OI Keaten Ex. 19 at 110.

This is consistent with the statement to OI by Zewe that he could not say that temperature of 230°F would have seemed significant if the baseline for comparison had been 130°F instead of 180°F (OI Keaten Ex. 27 at 10, 15). It does not appear to be consistent, however, with the above-described statements by Zewe shortly after the accident.

On the basis of the information from the GPU v. B&W lawsuit documents and from OI's investigation, the staff concludes that the licensee's response to the NOV Section 4A was inaccurate and incomplete.

Whether or not it is ultimately determined that the PORV was leaking on March 28, 1979, the licensee's response to NOV Section 4A did not disclose, and failed to take into account, significant information that was contrary to the position taken by the licensee. This is the case both as to licensee's statements that operators were not desensitized by abnormal plant conditions and that elevated valve discharge line temperatures were the result of a leaking code safety valve, thus implying failure to close the PORV block valve was not a violation of the emergency procedure.

The staff also is concerned with one other aspect of the licensee's response to the NOV. OI's investigation of changes to the Keaten Report elicited information concerning the licensee's response to the NOV concerning violation of the surveillance procedure for the emergency feedwater valves. The licensee denied having violated the cited requirement of the Technical Specifications. The Keaten task force, having become aware through Wallace of the argument being made in the response to the NOV, examined the TS requirement, concluded that it was ambiguous, but also found it clear that the intent of the Technical Specifications had been violated by the licensee.

Wallace and Arnold both characterized the argument made in the response to the NOV as "narrow" and "legalistic." Dieckamp described the argument as "kind of thin." While there is no indication that the operations personnel responsible for implementing this TS requirement engaged in the kind of hairsplitting that is shown by the response to the NOV, this licensee and others should understand that the staff expects information submitted by licensees to be "full, complete, timely and accurate." See 49 FR 8583, 8588 (March 8, 1984). Where the intent of a TS requirement is clear, as even the licensee's own Keaten task force apparently found it, a response such as that provided by licensee to the NOV is less than complete and less than acceptable.

While Wallace was most closely involved in preparing the response to the NOV, the responsibility for the licensee's inaccurate and incomplete statements must be shouldered by R. C. Arnold, who reviewed and signed the submission to the NRC, and by H. M. Dieckamp, who reviewed the response before it was submitted and chose "not to intervene."

Wallace presently holds a position at GPU's Oyster Creek facility; he has no responsibility in connection with the restart or operation of TMI-1. Arnold presently holds a position with GPU that is not related to any nuclear facility; he has no responsibility in connection with the restart or operation of TMI-1. H. M. Dieckamp's involvement is evaluated in Section 13.2 of this report.

The significance of the licensee's inaccurate and incomplete statements in its response to the Notice of Violation to the overall assessment of management integrity is addressed in Section 13.0.

8.4 Keaten Task Force Use of the Lucien Report

8.4.1 Background

One of the concerns identified by the staff in NUREG-1020LD, Section 10.2, was associated with the development and eventual use by the Keaten task force of a technical report entitled "Loss of Feedwater Flow Leading to the Accident of March 28, 1979" (hereafter referred to as the Lucien Report). This report was prepared by K. P. Lucien of Energy Incorporated (EI) under contract to the licensee. Lucien's original draft report was forwarded by a handwritten, undated memorandum from Lucien to "Bob" (B&W Ex. 344). The memorandum contained the following statement: "This is the draft of my report on the polishing/condensate/air systems for the Investigative Task Force. Per our understanding with R. Keaten, please launder this to bring it into line with your perception of the forthcoming master task force report." OI Keaten Ex. 41.

The original staff concerns related to the Lucien Report may be summarized as follows:

(1) Who was "Bob" and what was the "understanding" between Lucien and "Bob" concerning "laundering" Lucien's report for use in the Keaten Report?

(2) Why did Keaten not include, or fully reflect, Lucien's findings in the Keaten Report? Did the Keaten task force conduct further inquiry into Lucien's findings and determine that there was no bases for some of the findings?

(3) The final Keaten Report references a July 1980 revision to the Lucien Report. Are there significant changes between the original version of the Lucien Report and the referenced revision? If so, why were the changes made and who made them?

OI Keaten Ex. 20 at 16.

Investigation results and staff findings associated with questions 1 and 2 above are presented in this section of the report. The actual changes made to the Lucien Report, who made the changes and why (question 3) are discussed in detail in Section 9.0 of this report.

8.4.2 Investigation Results

The OI investigation determined that there were three versions of Lucien's report. The original document produced by Lucien was dated September 1, 1979 (OI Keaten Ex. 47). The first revision was made by Lucien following a meeting with three Met-Ed employees on December 3, 1979. As a result of an administrative error, this revision was also dated September 1, 1979 (OI Keaten Ex. 48). The final revision was made by Lucien after he received the results of the followup tests that were recommended in his initial report. This second revision, which served as his final report, was dated April 17, 1981 (OI Keaten Ex. 49).

As discussed in Section 9.2, the only people involved in physically modifying Lucien's report were Lucien himself and his immediate supervisor, T. L. Van Witbeck. Van Witbeck was also a member of the Keaten task force. No member of GPU upper management (Kuhns, Dieckamp, Arnold, or Clark) was involved in or influenced any of the changes to the Lucien Report.

The investigation identified the three individuals who were responsible for developing the section of the Keaten Report in which the Lucien Report is referenced as R. W. Keaten, Chairman of the task force; R. L. Long, task force member; and T. L. Van Witbeck, the senior EI resident at TMI.

Lucien stated during his interview with OI that his handwritten, undated memorandum to "Bob" (B&W Ex. 344) was sent to Long. Lucien recalled that he was directed by Van Witbeck to give Long his finished report. It was Lucien's understanding that Long was to receive all of the external reports that were being prepared as input to the Keaten Report and that Long's task was to extract their pertinent content for use in the body of the finished Keaten Report. Lucien understood that Long would not change or alter the technical content or findings of his report. Lucien indicated that his use of the term "launder" meant that Long should report the findings of the Lucien Report in a manner consistent with the written structure (style and format) of the finished Keaten Report. Lucien said the term "launder" was not meant to have any deceitful connotation. OI Keaten Ex. 42 at 3.

According to Long, it was his responsibility to receive GPU- and contractor-generated investigation reports and review them for pertinence to the task force activities. He said that he would review the reports for consistency with his understanding of the accident and would look for discrepancies between his understanding and the information reported. In such cases, he would raise questions to assure that what was to be reported was accurate. Long said that he did not go through all of the details and try to check everything that was done because there just was not time for that and his other tasks. OI Keaten Ex. 5 at 17.

Long stated that the initial draft of the Keaten Report (September 28, 1979) was prepared by Keaten. The initial draft was sketchy, and, according to Long, other members of the task force would rework the various sections, filling in the details. These revised sections would then be considered by the task force for inclusion in the task force report. OI Keaten Ex. 5 at 18, 19. According to Long, he and Van Witbeck were responsible for extracting the information from the Lucien Report that they thought pertinent to the Keaten Report. Long could not recall which one of them actually did the writing to incorporate the information into the Keaten Report. Id. at 20.

Long confirmed Lucien's explanation of the use of the term "launder." Long stated that the note from Lucien simply meant that Long would extract pertinent information and clean up the language in terms of polishing it. Long was not supposed to change the content, but was to make the style consistent with other task force input. Although Long could not recall if he changed any of the technical content in Lucien's report, he thinks it would have been highly unlikely because he considered Lucien an "expert in that area." Id. at 20, 21.

Once the task force was formed, Long stated that he reported directly to Keaten on all task force matters. He did not have contact with Arnold or Dieckamp regarding task force issues. Long believes that Arnold and Dieckamp were kept informed of task force progress by Keaten. Id. at 13-15.

Van Witbeck said that he reported to TMI with a group of EI personnel 2 days after the accident. He was originally assigned to the Accident Assessment Group under Long and worked principally on the TMI-2 accident sequence of events. OI Keaten Ex. 7 at 13. Once Van Witbeck was assigned to the Keaten task force, most of his interface with GPU management was through Keaten and Long. Van Witbeck assigned Lucien the task of investigating the events leading up to the loss of feedwater flow at TMI-2 on March 28, 1979. Neither Keaten nor Long were involved in Van Witbeck's decision regarding the content or scope of the investigation. Id. at 5. Van Witbeck stated that the Lucien Report was intended to be a technical data report (TDR) that would be released to anybody that wanted to look at it. It was not prepared solely as input for the Keaten task force. Id. at 8. Lucien would inform Van Witbeck of any problems he found and Van Witbeck, in turn, would inform management. Van Witbeck said he met with Long a minimum of once a week and earlier (time frame not specified) with Arnold on a similar basis. Van Witbeck stated that management's only concern was when conclusions were not supported by facts. Id. at 11, 12. Van Witbeck recalls being told by Arnold that Arnold had read the Lucien Report and said, "I don't agree with this, I think it's not supported." Id. at 13, 14. It does not appear from Van Witbeck's statement that Arnold was referring to the entire Lucien Report; however, Van Witbeck could not recall the portion of Lucien's findings that Arnold thought were unsupported (Id. at 14). (As discussed later in this section, Arnold does not recall receiving or reading the Lucien Report itself.) Van Witbeck also stated that "Bob Long, Bob Keaten and Bob Arnold . . . on a variety of occasions told us to tell it like it is and not to be intimidated by anybody. When they came back and questioned they were just in general questioning from a technical viewpoint, not from any other viewpoint. They never told us to reword something to soften it, just to be sure that what we were saying was indeed what we could substantiate." Id. at 39 and 40.

Van Witbeck stated that he had given Lucien a free hand with the report. Van Witbeck said, when he first saw Lucien's report, there were portions that he wanted to strike from the report. He did not believe some of Lucien's conclusional comments were appropriate on the basis of the technical content. Van Witbeck was particularly concerned about Lucien's comments regarding TMI-2 startup and test. He and Lucien discussed these comments at length;

nonetheless, Van Witbeck left the comments in the report and circulated it for first review. Id. at 12. Van Witbeck stated that he later made some minor changes to the Lucien Report; however, before making the changes he discussed them with Lucien over the telephone. Van Witbeck could not recall the exact parts that he modified. Id. at 42. Van Witbeck believes--from conversations he had with Lucien--that if Lucien were to rewrite the report, Lucien probably would not include some of his original conclusions. Van Witbeck believes that Lucien agrees that some of these conclusions could not have been drawn from the information uncovered at the time. Id.

Van Witbeck further stated that neither he nor his staff were ever told by GPU to suppress or change something, if it was technically valid. He said they were directed to do just the opposite: ". . . don't hide, don't color, tell us what's wrong, we've had the accident, let's see if we can't get things cleared up." Id. at 13.

Keaten stated that the first draft of the task force report was written by him and was distributed to members of the task force for comment on September 28, 1979. OI Keaten Ex. 4 at 12, 13. No one from the task force was specifically assigned to review the Lucien report; however, Keaten stated that Van Witbeck tended to take the lead in factoring the Lucien information into the task force deliberations since Lucien worked for Van Witbeck (Id. at 35, 37).

Keaten stated that he met with Lucien, on occasion, to discuss findings but did not recall the specifics (Id. at 37). Keaten remembered two versions of Lucien's report; however, he did not realize until recently that two versions were dated September 1, 1979. He does not recall which one of the September 1, 1979, versions he read. Although Keaten read the Lucien report, he stated that he relied on Van Witbeck to factor that information into the task force report (Id. at 37-40, 78). Keaten believes that he must have had a copy of Lucien's original draft report when he dictated the first draft of the task force report because there was a level of detail in his first draft of the Keaten Report (September 28, 1979) that he could not have remembered (Id. at 81).

Keaten recalled that Arnold had wanted the task force to look into the way the secondary side of the plant was treated during construction, startup, and operation. Arnold wanted to know if it was considered a "poor cousin" (Id. at 62, 63). Keaten agreed that the Lucien Report was very critical of GPU (Id. at 69) and he was surprised and disturbed about some of the things Lucien had discovered about the secondary side of the plant: poor record-keeping, equipment that was originally installed and then disconnected, testing listed as significant to turnover of the plant that never got done, and a general indication that they were not "running a very tight ship." Id. at 86. Keaten stated that he was rather surprised because he knew some of the people involved and he considered them good. Yet, the implications were there that "the practices were sort of sloppy." Keaten's general reaction to the Lucien findings was that "it in fact confirmed what Mr. Arnold had been worried about: that it seemed likely that the primary side was getting good attention, but it appeared that that was happening because of all the nuclear-safety-related requirements; and that there was not adequate concern for QA being applied on the secondary side." Id. at 86, 87.

Keaten believes that he received information about Lucien's findings from Van Witbeck and discussed them with Arnold before he ever received Lucien's written report (Id. at 69). Although he discussed some of the findings with Arnold and probably Dieckamp, Keaten said he would be surprised if he would have sent them a copy of Lucien's report. Keaten felt that the charter of the task force was to take the information and condense it for top management to learn the necessary information without having to plow through the details. Id. at 69, 70.

In discussing what was important to Keaten with respect to Lucien's findings, Keaten stated that the emphasis was not on Lucien's report itself, but on the findings and the documentation of those findings. Keaten said that by the time the report came out, the task force was involved in other things that went beyond the initiating event. Keaten's explanation of how he put the Lucien Report into perspective was:

> Keep in mind that although this was important, and it was sufficiently important that a summary of these findings--and I have to think it was a fairly decent summary[--]appeared in the task force report as one of the first sections and that section of the task force report is also credible. But it was even more urgent in our minds to understand why the accident had occurred. And most of these things although they are indicative of practices that should be corrected--I trust by now have been corrected--were not direct contributors to the accident. And so, while we did reflect that in the task force deliberations; and I do remember discussing this type of thing with Mr. Arnold, we would not have dwelt or met to the point that it interfered with the other activities. OI Keaten Ex. 4 at 71, 72.

During Keaten's deposition (January 7, 1982) in the GPU v. B&W lawsuit, he stated that some of the language in the Lucien Report did not belong in a professional report (Keaten at Dep. Tr. 420). During his interview with OI, Keaten confirmed that he thought in certain respects the Lucien Report was "unprofessional." Keaten said: "I was concerned that some of the language in there was a little emotional in content. I did not question the facts that are in the report. And in fact, many of those facts are reflected in the task force report." OI Keaten Ex. 4 at 41, 42. Keaten recalled that he discussed the unprofessional nature of portions of the Lucien Report with Van Witbeck after Lucien's final report (April 17, 1981) was received. He said that the discussion with Van Witbeck centered around whether to make the Lucien Report a GPU document (that is, a technical data report). Keaten stated that because of the language in the report, not the facts, he did not want to sign his approval to the document. Id. at 81, 82. The Lucien Report was accordingly not made a GPU technical data report.

The role of GPU upper-level management (W. G. Kuhns, H. M. Dieckamp, R. C. Arnold, and P. R. Clark) in changes to the Keaten Report is discussed in Section 8.2 of this report. OI did not question Kuhns about the Lucien Report; however, the report was discussed with Dieckamp, Arnold, and Clark.

Dieckamp, President and Director of GPU Corporation, stated that he knew Van Witbeck was on the Keaten task force and he also knew that before that Van Witbeck had worked on developing the TMI-2 accident sequence of events. Other than that, Dieckamp was not aware that EI was involved in the investigation of the loss of feedwater flow event that initiated the accident. OI Keaten Ex. 16 at 33, 34. Dieckamp stated that he had never seen the Lucien Report until the day before his interview with OI, and he had never discussed the contents of the report with anyone. Although he recalls discussions with Keaten about what conclusions were reached in this area, he did not have an understanding of the source of the information or who had done the investigation. Id. at 34, 38, 39. Dieckamp did not discuss with Arnold or Keaten where the recommendations came from. He was willing to accept that they were valid observations and recommendations from the task force, but he did not look beyond that to determine the source. Id. at 43, 44.

From the testimony provided by Arnold, it appears that his role in participating in this section of the Keaten Report was minimal. Arnold stated that he was provided oral reports periodically from E. G. Wallace on the progress of the various issues under review by GPU at the time, including those that were being covered by the Keaten task force. At various times he also would talk directly with Keaten and Long on specific areas in which the task force had been developing information. OI Keaten 17 at 23, 24. Arnold stated that he did not recall seeing a copy of the Lucien Report until he was preparing for his interview with OI (Id. at 39). Arnold was neither aware of Lucien being the one who was working on the loss of feedwater investigation nor does he believe that he was sent a copy of Lucien's report (Id. at 41).

From January 20, 1980, through the final publication of the Keaten Report on December 15, 1980, P. R. Clark served as Vice-President of Nuclear Activities for GPUSC (Arnold's deputy). Clark reported that he first became aware of the Keaten Report sometime in the summer or fall of 1980 (OI Keaten Ex. 18 at 5). Clark was neither responsible for overseeing the task force nor directing any task force activities (Id. at 6). Clark did not recall being familiar with or reading the Lucien Report (Id. at 19).

8.4.3 Staff Findings

The staff's first question about the Lucien Report concerned the identity of "Bob" in B&W 344 and the meaning of the term "launder" in that document. On the basis of the explanations provided by Lucien and "Bob" Long on the "launder" memorandum (see Section 8.4.2), coupled with the fact that there is no evidence to indicate that Long made any changes or modifications to the Lucien Report, the staff concludes that there was no improper intent or action on the part of either Lucien or Long related to this memorandum. The staff's second question about the Lucien Report concerned the incorporation of Lucien's findings into the Keaten Report. As discussed in Section 8.4.2, R. W. Keaten incorporated Lucien's findings in the initial draft of the Keaten Report. While Keaten could not recall if he had a copy of the Lucien Report at the time he dictated the draft task force report, the evidence would indicate that the Lucien Report was available for Keaten's use at the time.

A comparison of the September 28, 1979, Keaten Report draft with Lucien's original September 1, 1979, report shows that many of the factual items discussed in the Lucien Report are reflected in the draft of the Keaten Report. Some of the information is extremely detailed, such as the identification numbers of specific valves and pressure switches, test scenarios and results, and the identification of selected design and testing deficiencies. Compare, e.g., Keaten Report (10/28/79) with Lucien Report (09/01/79): at 5, 6 with A-3 through A-5 (newly established scenario); at 8 with C-11 (polisher bypass valve design deficiency); at 10 with C-5 (effect of hydraulic shock). Thus, the staff concludes there is a high probability that Keaten had available and used Lucien's original report of September 1, 1979, when he authored the first draft of the Keaten Report.

The Lucien Report identifies deficiencies in design, construction, testing, maintenance and operating practice associated with the instrument air, condensate polishing, and condensate systems at TMI-2. In some cases, these deficiencies are further broken down into numerous specific problems that are discussed in detail by Lucien. Several of Lucien's deficiencies are supported by factual evidence such as design documents and test records; however, many of the deficiencies are not supported by such evidence. These latter deficiencies appear to be general conclusions drawn by Lucien during his investigation. Examples of these types of conclusions would include the following extracts:

(1) "Based upon observation of the extremely poor condition in which the regeneration station equipment has been maintained. . ."

(2) ". . . the wide variation in settings indicates gross lack of system knowledge, attention, or both."

(3) "The loop diagrams. . . contain technical errors that reflect a lack of total circuit comprehension."

(4) "This review indicated that, while long-term reliability [of strip chart recorders] was generally very poor due to inadequate operating and maintenance practices . . ."

OI Keaten Ex. 47 at A-5, B-8, B-8, and B-12, respectively.

The first draft of the Keaten Report summarizes many of the major deficiencies in the Lucien Report that are supported by factual evidence. Compare, e.g., Keaten Report (10/28/79) with Lucien Report (09/01/79): at 3 with C-2, C-3 (computer and annunciator alarms inhibited, booster pump wiring error); 7, 8 with B-6 (modifications negated polishing system's ability to sustain loss of instrument air and loss of control power); 8 with C-11 (design deficiency not identified during construction testing or functional testing); 9 with C-9, C-20 (technical inadequacies and lack of review and approval of electrical test procedures). However, because these deficiencies are consolidated and summarized, the net effect is such that the numerous specific deficiencies associated with the operability of the condensate polishing and condensate systems are not fully brought to light. Moreover, the overall tone of the Keaten Report in this area is much less critical of the licensee and the licensee's contractors than the detailed writeup presented by Lucien.

For example, the Lucien Report identifies significant problems associated with pre-turnover testing of the condensate polisher and condensate systems. In addition to identifying technical inadequacies in selected procedures, Lucien implies that test records may have been falsified. The Keaten Report summary identifies only technical inadequacies in electrical test procedures. B&W 347 at 9. The conclusions and recommendations sections of the initial Keaten draft provided little additional information on specific problem areas:

> As-built plant systems and components showed significant discrepancies with design requirements even in safety related systems. B&W 347 at 42, 43.
>
> The general condition of the secondary side of the plant should be thoroughly reviewed by a careful inspection of the plant and comparison to the design requirements. In the case of TMI-1 a review of a selected sample of the systems may be adequate if severe deficiencies are not found. For TMI-2 the entire BOP plant [balance of plant] should be carefully inspected prior to restart. B&W 347 at 48.

R. Keaten stated that he did not have a problem with accepting deficiencies reported by Lucien that were supported by factual evidence (OI Keaten Ex. 4 at 41-42). Keaten believes that the Lucien Report findings are presented in the Keaten Report in a "fair and balanced manner" (Id. at 71).* Keaten also stated that while he thought the Lucien findings were important, he was more interested in understanding why the accident occurred. Keaten believed that many of the practices identified by Lucien needed to be corrected, but, in his view, they were not direct contributors to the accident; therefore, the task force did not concentrate their efforts in this area. Id. at 71. According to Keaten, if something was considered outside the scope of the task force, he would not have a problem with the deficiency being noted in the technical report; however, he may not have included it in the task force report. Id. at 59, 60.

The OI investigation produced evidence that Keaten's initial writeup associated with the Lucien findings may have been modified to some extent by Long and Van Witbeck. Several changes occurred to this section between Keaten's initial draft of September 28, 1979, and the final task force report dated December 15, 1980. The majority of changes appeared to be the result of incorporating the followup test results and evaluations that were originally recommended by Lucien or repackaging (editing) Keaten's original writeup. While some of Keaten's original information is deleted in the final version (e.g., reference to technical inadequacies in electrical test procedures), the conclusions and recommendations section of the Keaten Report are markedly strengthened with respect to problem identification and resolution for the secondary plant.

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*The staff notes that during investigative interviews with T. M. Hawkins and I. D. Porter, they stated that not all of the detailed findings of the Lucien Report were carried forward to the Keaten Report. However, it is not clear from their brief statements whether or not they disagreed with Keaten's description of his treatment of the Lucien findings as "fair and balanced." OI Lucien Ex. 2 at 77; Ex. 4 at 30; see Section 9.2 (for discussion of role played by Hawkins and Porter in changes to Lucien Report).

> Attempts to determine the exact nature of the initiating event led to the discovery of (1) undocumented and in some cases apparently erroneous modifications to secondary system components, (2) system and component operating problems which should have been detected and corrected during initial plant startup, and (3) substandard practices in modifications to electrical circuitry. OI Keaten Ex. 13 at 30.
>
> The General condition of the as-built secondary side of the plant should be verified by a careful review of design requirements and a detailed comparison of the entire BOP to those requirements. As built drawings and associated documents should be verified and procedures and practices for control of all future changes should assure that these drawings/documents are kept current. Specific problems identified in this report (e.g., in Section A.2, A.3, C.5, & F.2) and others identified by the BOP review should be corrected prior to the restart of Unit 2. Id. at 43.

In summary, the staff concludes that the initial incorporation of Lucien's findings into the Keaten Report did not entirely reflect the inadequacies that were identified by Lucien in the condensate polishing and condensate systems, particularly with respect to the startup test deficiencies. While the later drafts of this section of the Keaten Report do not go back and pick up any of the deficiencies that were not originally incorporated by Keaten, the conclusions and recommendations sections of the Keaten Report are markedly strengthened with respect to problem identification and resolution for the secondary side of the plant. Furthermore, the OI investigation did not produce evidence that would indicate the actions or motives of R. W. Keaten, R. L. Long, or T. L. Van Witbeck were improper with respect to the incorporation of Lucien's findings into the Keaten Report.

The overall role of GPU upper management (W.G. Kuhns, H. M. Dieckamp, R. C. Arnold, P. R. Clark) in influencing changes to the Keaten Report is evaluated in Section 8.2 of this report. The OI investigation did produce evidence that Arnold and Dieckamp were briefed by Keaten regarding the results of Lucien's findings and that they did provide comments on the Keaten Report drafts; however, there is no evidence to indicate that their comments affected the section of the Keaten Report in which Lucien's findings are described.

On the basis of the staff's review of the GPU v. B&W lawsuit record and the evidence compiled by OI during its investigation, the staff concludes that the process by which the Lucien Report findings were incorporated into the Keaten Report did not involve improper influence by GPU management.

8.5 Financial/Technical Interface

8.5.1 Background

The staff identified financial/technical interface in NUREG-1020LD, Section 10.9, as one of the areas in which the GPU v. B&W lawsuit documents raised sufficient questions to require further inquiry. Financial/technical interface was raised as an issue in the restart proceeding by the Commission as issue (6) in CLI-80-5: "whether the relationship between Metropolitan Edison's corporate finance and technical departments is such as to prevent financial considerations from having an improper impact upon technical decisions." The ASLB specifically addressed the question whether the licensee prevented "financial considerations from having an improper impact upon technical decisions." See 14 NRC 381, 518 (1981). After hearing evidence on this issue, the ASLB concluded that "the licensee's organizational framework and its practice of committing substantial resources to its nuclear business provides reasonable assurance that the relationship between its corporate finance and technical departments is such as to prevent financial considerations from having an improper impact upon technical decisions" (Id.). This conclusion was consistent with staff testimony that there was no indication of undue influence of financial considerations on TMI operation before the accident (see NUREG-0680, Supp. 1 at 26). The ASLB also heard evidence on the relationship between proposed budget cuts in the maintenance area at TMI-1 and management attitude toward safety, ultimately finding in the licensee's favor on this issue [See 14 NRC 381, 493-94 (1981)].

Several specific items were cited by the staff in NUREG-1020LD, Section 10.9, as relevant to the financial/technical interface question: (1) maintenance staffing, particularly as to preventive maintenance; (2) pace of plant startup; and (3) disposition of a recommendation concerning an automatic bypass in the condensate polisher system. While no separate investigation in these areas was requested, the staff asked OI "to focus on the comments of senior plant management relating to maintenance, plant startup, and the condensate polisher at TMI-2, and to management deficiencies generally, as it conducts its investigation into the Keaten Investigation." NUREG-1020LD, Section 10.9, at 10-23.

8.5.2 Investigation Results

The OI investigation of the Keaten Report has provided some additional information relevant to the financial/technical interface issue.

A major issue identified by the Keaten task force was the adequacy of the resources that were available to address problems. Keaten expressed the matter in this way: "the people that we had interviewed and talked with were honest and sincere people that were trying to do a very difficult job and that they just didn't have the resources to do it with." OI Keaten Ex. 4 at 259. As a result of these findings, the Keaten task force identified as its first recommendation the need to increase resources (Id.).

The resource limitation manifested itself on the secondary side of the plant. Keaten stated that one of the issues Arnold asked the task force to look into was whether the secondary side of the plant was being treated as "the poor cousin." Id. at 62. The task force found that the secondary side "really wasn't getting everything that it needed" (Id. at 63). Keaten described himself as "surprised" and "disturbed" at some of the things that were found by Energy Incorporated concerning the secondary side (Id. at 86). His reaction was that Arnold's concerns had been confirmed in that "there was not adequate concern for [quality assurance] being applied on the secondary side" (Id. at 86, 87). When asked about Miller's description of the ground rules under which he was operating ("If it wasn't safety-required, or didn't degrade the ability of the plant to run 100 percent power, it wasn't a necessary change. . . ."), Keaten said the task force interpreted this as an expression that additional resources were needed (Id. at 273).*

Keaten was asked about the comments of J. Logan concerning preventive maintenance. Keaten said there was "considerable concern on the part of the task force about the situation with preventive maintenance." Id. at 277. The task force found that corrective maintenance needs were so demanding that not enough resources were left available for an adequate preventive maintenance program (Id. at 277, 278). The recommendation of the task force for more resources was based, in part, on this finding (Id. at 278). Since then, the allocations for staff and dollars for maintenance activities "increased enormously" and the preventive maintenance and corrective maintenance functions are performed by separate staffs (Id.). While Keaten had only limited knowledge of the present situation, he believed that the concerns raised to and by the task force in this area had been satisfied (Id. at 279).

The Keaten task force also attempted to explore the issue of pace of plant startup. Despite some statements by persons interviewed by the task force that the plant had been rushed to startup, Keaten said that the feedback to the task force "without exception" was that the pace of startup was not too fast in order to be safe (Id. at 238, 239). For example, G. Kunder told the task force in an interview that the pace of startup was "too fast for the resources that we had available" (B&W 347M at 14) and that he "wouldn't operate the plant, knowing what I know now" (Id. at 25-26). He also stated that "the unit was deemed safe to operate" but "there were some operational problems involved that made the unit less reliable" (Id. at 14, 25). He later added that he believed management "viewed the unit as safe and ready to operate" (Id. at 25). Kuhns told OI that, from his information, "there was no management pressure to force that unit into service" (OI Keaten Ex. 14 at 62). Dieckamp said that no one had ever come to him in the context of plant startup and said "what we're doing is unsafe" (OI Keaten Ex. 16 at 162).

Van Witbeck said that the task force was told of feelings by people in the startup group that management had decided "that the startup on Unit 2 would not cost as much as the one on Unit 1 and that the budgetary screws were held tight on those folks" (OI Keaten Ex. 7 at 80, 81). He believed that the startup personnel felt "they did the best job they could in the budget and in the time frame they were allocated to do the job" (Id. at 36, 37).

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*Keaten told OI that the task force did not specifically pursue the question of who told G. Miller what the "ground rules" were. To the best of Keaten's understanding, "it was something that had been communicated either directly or indirectly to [Miller] by the Metropolitan Edison management." OI Keaten Ex. 4 at 288.

Another specific area cited in NUREG-1020LD as relevant to financial/technical interface was the failure to install a bypass to the condensate polisher system. Keaten said that he had discussed that specific matter with Arnold in the context of the task force's recommendation that additional resources were needed. He pointed out that there were technical obstacles to automating the condensate bypass line as had been suggested. Keaten was satisfied as a result of the task force's investigation that a technical judgment had been made at the time not to take the recommended action. OI Keaten Ex. 4 at 138, 139. See also letter dated October 14, 1983, from H. M. Dieckamp to the Commission, enclosing Response of GPU Nuclear Corporation to the Public Version of the NRC staff's Report on "GPU v. B&W Lawsuit Review and Its Effect on TMI-1" (NUREG-1020). Whether or not there were valid technical reasons for rejecting the suggestions by operators for an automatic bypass, however, is not significant. The fact that such suggestions were made was symptomatic of a system that was not functioning as the operators expected. Lucien's finding, as discussed in Sections 8.4 and 9, were construed by Keaten as an indication that the secondary side of the plant was not getting the resources it needed. See, e.g., OI Keaten Ex. 4 at 63.

The staff also stated in NUREG-1020LD that financial considerations may have been involved in the decisions to violate the procedure specifying block valve closure for a leaking PORV and to adopt a leak rate calculation procedure by a temporary change notice that was later found by the NRC to be a violation. These specific areas were not pursued by the OI investigation.

8.5.3 Staff Findings

The financial/technical interface issue was raised by the staff in NUREG-1020LD because the GPU v. B&W lawsuit documents contained certain information that appeared material to CLI-80-5 issue (6) and that appeared to contradict the staff's testimony, relied upon by the ASLB, that there was no indication of undue influence of financial considerations on TMI operation before the accident. The evidence from the GPU v. B&W lawsuit documents and from the OI investigation suggests that insufficient resources had been made available at TMI-2, particularly with respect to the secondary side of the plant. This conclusion is at variance with the staff's testimony cited above.

The ASLB's resolution of CLI-80-5 issue (6) was based on a wide range of evidence, including the licensee's emphasis on safety, its budgeting process, the history of resource commitment by GPUN as compared with the nuclear industry average, and the increased resources applied by GPUN in 1980 and 1981 over previous years (14 NRC at 514-518). The ASLB concluded that "Licensee's organizational framework and its practice of committing substantial resources to its nuclear business provides reasonable assurance that the relationship between its corporate finance and technical departments is such as to prevent financial considerations from being an improper impact upon technical decisions" (Id. at 518).

While the information discussed above from the GPU v. B&W lawsuit documents and the OI investigation of the Keaten Report is not consistent with the unqualified statement by the staff that there was "no indication" of undue influence of financial considerations on TMI operation before the accident, the staff finds that there is no need to seek the reopening of this issue in the restart proceeding. The ASLB's decision recited and relied on substantial evidence in addition to the particular piece of staff testimony now called into question. Much of that evidence focused on the time frame since the accident rather than the preaccident period to which the particular staff testimony was directed. Under these circumstances, the information now available on the financial/technical interface issue is not considered by the staff to have the potential to change the result reached by the ASLB in this issue. Thus, the staff does not consider it necessary or appropriate to reopen the evidentiary record on this issue.

8.6 Reportability of the Keaten Report

8.6.1 Background

The final Keaten Report (dated December 15, 1980) was provided to the NRC on November 2, 1981, after Commissioner Gilinsky requested that the licensee produce the report. In its January 20, 1984, list of integrity issues, the Commission included the issue of whether the licensee provided the Keaten Report on a timely basis.

8.6.2 Investigation Results

During OI's interview of Keaten, he was asked whether he had any understanding that the task force might come upon information that the licensee would be required to report to the NRC. Keaten said that he was aware of the general requirements for reportability. Keaten stated that the question of reportability of the task force report had not been considered by him and he could not recall "ever being a part of any discussion where that issue ever came up." OI Keaten Ex. 4 at 88, 89, 289. He also stated, however, that he had "a nagging memory that reportability did come up" (Id. at 88, 89). Keaten said that since Wallace, the manager of pressurizer water reactor (PWR) licensing, was one of the participants in the investigation, Keaten "probably would have relied upon on him to be sensitive to reportability needs" (Id. at 89).

Kuhns told OI that he did not know why the Keaten Report had not been made available to the NRC sooner than it had been. He described the failure to provide the report earlier as "more of an oversight than anything else" and "nothing deliberate" (OI Keaten Ex. 9 at 62).

OI also questioned GPU senior management about whether it had originally been intended that the Keaten Report would be released to the public. In a July 23, 1979, memorandum from R. W. Keaten to J. Herbein (B&W 342), the expectation was expressed that the report "will undoubtedly be published and will be closely scrutinized by the NRC, the public, and perhaps the courts . . . " During a November 28, 1983, meeting of the Commission, Dieckamp stated that the report had not been "designed as a document for external distribution." Arnold explained that while the Keaten Report was not being developed for the purpose of providing it to the NRC, he understood from the outset that it would most likely become a public document and/or be provided to the NRC. OI Keaten Ex. 19 at 13. Similar statements were made by Dieckamp (OI Keaten Ex. 16 at 24, 26-27, 30-33) and by Kuhns (OI Keaten Ex. 14 at 28, 32, 34).

8.6.3 Staff Findings

As stated above, the issue of whether the licensee failed to meet an obligation to report the Keaten Report to the NRC was raised by the Commission's January 20, 1984, list of integrity issues. The staff is not aware of any specific reporting requirement in the regulations or in the facility license or Technical Specifications that would impose an obligation to report the Keaten Report. The question that remains, then, is whether the licensee's board notification obligations under Duke Power Company (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-143, 6 AEC 623 (1973), and other cases, would encompass the Keaten Report.

The various drafts of the Keaten Report came to the staff's attention through the staff's review of the GPU v. B&W lawsuit documents. As a part of its review of the lawsuit documents during the summer of 1983, the staff reviewed the Keaten Report and its drafts to determine whether they contained information relevant and material to any of the issues involved in the restart proceeding. The staff concluded that the Keaten Report drafts and certain information provided to the Keaten task force were relevant and material to the issue of management integrity. See NUREG-1020LD, Section 10.9. At the same time; however, the staff concluded that none of the information in the Keaten Report was relevant and material to any of the other design, emergency planning, or management-related issues in the restart proceeding.

As the ASLAB recently noted, "[w]hat began as an inquiry into primarily licensee's technical capability and resources has evolved--as a necessary consequence of those developments--into a search for answers to questions concerning the 'integrity' of business management as well" [ALAB-772, 19 NRC ____, slip op. at 10, 11 (May 24, 1984) (footnote omitted)]. Management integrity, as such, was not an issue in the restart proceeding in December 1980 when the final Keaten Report was approved by the task force. Given the evolving nature of the management "integrity" issue in this proceeding and the lack of relevant and material new technical information in the final Keaten Report (see NUREG-1020LD Sections 3 through 9), the staff concludes that the licensee did not have an obligation to provide the Keaten Report.

With respect to the other issue explored by OI concerning the November 28, 1983, statement by Dieckamp that the Keaten Report had not been designed for external distribution, the staff does not believe that OI produced any evidence that the statement was inaccurate or was intended to mislead the Commission.

8.7 Conclusion

The staff's assessment of certain information from the GPU v. B&W lawsuit record led the staff to request that OI conduct an investigation of the licensee's internal investigation of the March 28, 1979, accident for any improper conduct in relation to the investigation and the development of the report of the investigation (the Keaten Report). On May 18, 1984, the Director of OI forwarded to the EDO and the Commission its report, entitled "General Public Utilities - Alleged Improper Influence by GPU Upper Management Causing Changes To Be Made to Its Internal TMI-2 Accident Review Report."

The staff has reviewed OI's report and its exhibits; the results of the staff's review are documented in the foregoing subsections of Section 8. The principal conclusions drawn by the staff, as discussed above, are

(1) that the process of review of the drafts of the Keaten Report by management did not result in a final product that was improperly influenced so as to reflect better on the licensee than would otherwise have been the case (*see* Section 8.2)

(2) that statements were made by the licensee in its December 15, 1979, response to the October 25, 1979, Notice of Violation that were neither complete nor accurate and that were contrary to other information in the possession of the licensee (*see* Section 8.3)

(3) that there was no improper conduct in connection with the investigation and report of K. Lucien concerning the loss of feedwater flow leading to the accident or the incorporation of Lucien's input into the Keaten Report (*see* Section 8.4)

(4) that evidence from the *GPU v. B&W* lawsuit documents and from the OI investigation of the Keaten Report concerning the financial/technical interface issue is at variance with the staff's testimony that there was no indication of undue influence of financial considerations on TMI operation before the accident (*see* Section 8.5)

(5) that the the licensee was under no obligation to provide the final Keaten Report to the NRC until requested in November 1981 (*see* Section 8.6)

For the reasons discussed above, the conclusions concerning inaccurate and incomplete statements (*see* Section 8.3) are material to the staff's overall assessment of management integrity and will be addressed in Section 13.0.

9.0 CHANGES TO THE LUCIEN REPORT

9.1 Background

As discussed in Section 8.4, one of the concerns identified by the staff in NUREG-1020LD, Section 10.2, was associated with the development and eventual use by the Keaten task force of a technical report entitled "Loss of Feedwater Flow Leading to the Accident of March 28, 1979" (hereafter referred to as the Lucien Report). This report was prepared by K. P. Lucien of Energy Incorporated (EI) under contract to the licensee. Lucien's original draft report was forwarded by a handwritten, undated memorandum from Lucien to "Bob" (B&W Ex. 344). This memorandum contained the following statement: "This is the draft of my report on the polishing/condensate/air systems for the Investigative Task Force. Per our understanding with R. Keaten, please launder this to bring it into line with your perception of the forthcoming master task force report."

In a memorandum from H. R. Denton (NRR) to B. B. Hayes (OI) dated November 7, 1983, the staff identified specific questions that should be answered concerning issues identified in NUREG-1020LD. The relevant questions pertaining to the relationship between the Lucien and the Keaten Reports were stated as follows:

> 1. Was there an understanding among K. LUCIEN, R. KEATEN and 'Bob' concerning 'laundering' of the Energy Inc. technical input to the Keaten task force? On what basis did K. LUCIEN believe there was such an understanding? Who was 'Bob'?
>
> 2. Why did R. KEATEN not include or fully reflect in the task force reports significant technical information concerning deficiencies in the condensate polisher and the manner and environment in which it was tested? Did the Keaten task force conduct further inquiry and conclude that K. LUCIEN'S suggestion that credit was taken for preservice testing which was not done as stated? If not, why not?
>
> 3. Where is the August 1, 1979 [July 1980] 'final' revision of the Energy Inc. report referred to as Reference 1 in B&W 356? Are there significant changes between the original version tendered to GPU (B&W 343) and that document? Who made any revision and were they made at GPU's request?

Memorandum from H. R. Denton to B. B. Hayes dated November 7, 1983, at 16.

Questions 1 and 2 above are discussed in Section 8.4 of this report. The investigation results and the staff's findings presented in this section deal only with changes made to the Lucien Report and the motive for those changes (question 3 above).

OI's investigation into the Keaten Report matters is contained in the report entitled, "General Public Utilities Nuclear/Alleged Improper Influence by GPU Management Causing Changes To Be Made to its Internal TMI-2 Accident Review Report" (1-83-012), dated May 18, 1984 (OI Keaten). That investigation determined that the original Lucien Report underwent subsequent changes that resulted in some of the information critical of the licensee's startup and test program being modified. The investigation also determined that these changes were not the result of corporate influence but, rather, that the changes did occur after members of the site startup and test group met with Lucien. Further inquiry into the circumstances surrounding the changes to the Lucien Report itself are documented in a separate OI investigation report (Q-1-84-006) entitled, "General Public Utilities Nuclear/Possible Improper Influence Exerted on Contractor to Change Report Critical of the Licensee," dated May 4, 1984 (OI Lucien).

9.2 Investigation Results

In June 1979, K. P. Lucien, an employee of EI, was assigned to TMI-2 under contract with GPU. T. L. Van Witbeck (the senior EI resident at TMI) was Lucien's immediate supervisor and served as a member of the Keaten task force. It was Van Witbeck who gave Lucien the assignment to investigate the factors that led up to the loss of feedwater at TMI-2 on March 28, 1979. OI Lucien Ex. 1 at 1.

As a consultant to the task force, Lucien worked independently of other task force members. Lucien met with Keaten and others only for periodic progress reports during June through August 1979. During the time he was conducting his investigation, Lucien stated that no one attempted to influence his investigation in any manner. Early in the investigation, Lucien told Keaten that on the basis of what he had found to date, his final report could be very critical. According to Lucien, Keaten had told him emphatically to report things as he saw them. _Id._ at 1, 2.

On or about September 1, 1979, Lucien left TMI-2 for a new assignment with EI in California. When he departed, his investigation was complete and his report was in its final stage of typing. Lucien left instructions with a junior engineer at EI to proofread the report when it was received from the typing pool, to provide a copy to R. L. Long ("Bob"), to put a copy in the files kept by EI on GPU's behalf, and not to disseminate the report to anyone else. _Id._ at 3.

Sometime after September 1, 1979, Lucien received a copy of his report in the mail. Lucien proofread the report and sent it back to EI. Lucien identified the report entitled "Loss of Feedwater Flow Leading to the Accident of March 28, 1979," dated September 1, 1979, as this report (OI Keaten Ex. 47). Lucien stated that this version of the report was meant to be his final product. The report did identify additional areas that warranted further investigation; however, Lucien did not know if these areas would be followed up or not. _Id._ at 2.

Lucien's report identified deficiencies in many areas and was critical of the startup and test program at TMI-2. His report (1) implied that test records for balance-of-plant (BOP) equipment may have been falsified, (2) identified problems with certain test procedures that would prevent testing from being accomplished if the procedures were followed as written, (3) identified concerns about the piecemeal approach to prestartup testing, and (4) identified hardware deficiencies in as-built systems, that is, wiring errors and other problems that would have precluded the systems from operating as designed. OI Lucien Ex. 6 at 1.

J. Barton had been the Start-Up Manager for TMI-2 until November 1978 when he was reassigned as Project Site Manager at Forked River, New Jersey. Barton returned to TMI-2 at the end of May 1979 to work in the area of radioactive waste management and plant cleanup. During the summer of 1979, Barton heard that Van Witbeck was having a report written that addressed the startup and testing of the emergency feedwater system. Barton requested a copy of the report from Van Witbeck. Barton was concerned about the accuracy of the report since he had been in charge of the test program during that time. OI Keaten Ex. 43 at 1.

Barton stated that during a cursory review of the Lucien Report, he discovered several statements concerning the content and scope of the test program that he thought were inaccurate. According to Barton, he asked three individuals who were involved in the TMI-2 startup and test program at the time to take an in-depth look at the report. These individuals were: T. M. Hawkins, formerly Assistant Superintendent of Start-Up and Test for GPUSC; I. D. Porter, formerly Lead Instrumentation and Control (I&C) Engineer for Start-Up and Test for GPUSC; and S. Kakarla, formerly with United Engineering and Constructors (UE&C) Start-Up and Test Department. Id. at 1.

Following their review, Barton recalled that Porter, Hawkins, and Kakarla told him there were several areas in the Lucien Report with which they disagreed. Barton does not think he discussed the specific points of disagreement with them, but suggested that a meeting be set up with EI to discuss the points of disagreement. Following this conversation, Barton apparently had no further involvement with either Porter, Hawkins, Kakarla, Van Witbeck, or Lucien regarding the Lucien Report. Id. at 1, 2.

According to Hawkins and Porter, they were not directed by Barton to provide any written comments on the report. They believed that Barton thought the Lucien Report was not very factual and they should take a look at it (OI Keaten Ex. 44 at 8; Ex. 45 at 6). On the basis of the review by Hawkins, Porter, and Kakarla, Porter stated that he called Van Witbeck and requested that he arrange a meeting with Lucien to discuss some inaccuracies in the report (OI Keaten Ex. 44 at 9).

Lucien stated that sometime before December 1, 1979, Van Witbeck called him and told him that certain plant personnel wanted "to take issue" with him about his report and Van Witbeck asked Lucien if he was prepared to defend its contents. Lucien replied that he was, and on or about December 1, 1979, he returned to TMI. OI Lucien Ex. 1 at 3.

On December 3, 1979, Lucien attended a meeting with Van Witbeck, Hawkins, Porter, Kakarla, and J. Birt (another EI employee). According to Lucien, Hawkins and Porter were the most vocal participants at the meeting and both indicated that they did not like some of the implications in his report. Lucien said that Kakarla did not have much to say at the meeting. Id. at 4. Lucien stated that Hawkins, Porter, and Kakarla attempted to get him to shift some of the inferred blame away from the startup group for problems identified in the report. Lucien believed that these individuals felt personally taken to task (by his report) for problems that they thought were beyond their control. Id. at 9.

Lucien stated that many changes were discussed during the meeting; however, only 10 changes were actually made by him as a result of the meeting. These changes were provided by Lucien to Van Witbeck in the form of four handwritten pages of revisions to be incorporated into Lucien's report of September 1, 1979. Id. Encl. 5.

Lucien's reasons for making the changes may be summarized as follows:

(1) During his investigation, certain test records were not available but were later found by Hawkins, Porter, and Kakarla.

(2) During the writing of his report, Lucien used certain derogatory words or phrases that he could not technically defend.

(3) During the meeting of December 3, 1979, Lucien was informed that certain pretest inspection (grooming) efforts were standard operating practice, done without documentation, at TMI-2. On the basis of that practice, Lucien concluded that the tests, identified in his report as not being possible to complete in one day, as the test records indicated, could possibly have been completed in one day and that poor recordkeeping related to pretest grooming efforts may have been the issue.

(4) During the meeting, Lucien was informed that the inadequacies identified in the report associated with GPUSC Start-Up and Test not reviewing and approving electrical test procedures performed by UE&C were a "management policy" and not a shortcoming on their part as startup engineers.

Id. at 4-9.

Van Witbeck took Lucien's revisions and had them incorporated into the report; however, as a result of an administrative error, the report cover sheet was not changed. Thus, the version of the report containing the changes made as result of the meeting of December 3, 1979, also bears the date of September 1, 1979 (OI Keaten Ex. 48). OI Keaten Ex. 7 at 21, 22.

There was also one additional revision to the Lucien Report. Sometime in 1979 or 1980, Lucien became aware that J. Saunders (EI) was assigned some of the followup work that Lucien had recommended in his original report. Lucien characterized this work as primarily hardware inspections and obtaining test results and not necessarily increasing the scope of the investigation. As this work was completed, Saunders provided the results to Lucien. Lucien later incorporated some of these findings in the final revision dated April 17, 1981 (OI Keaten Ex. 49). OI Lucien Ex. 1 at 2. All but one of the changes that Lucien made to his report as a result of the meeting held on December 3, 1979, were carried forwarded into his final report. No additional changes significant to the OI investigation were identified in Lucien's final revision of April 17, 1981. OI Keaten at 66, 67.

Two of the individuals identified as having been involved in changes to the Lucien Report that occurred as a result of the meeting of December 3, 1979, are currently in key management positions with respect to the safe operation of TMI-1. Hawkins is currently the Manager of Start-Up and Test for TMI-1, and Porter is currently Hawkins' assistant. On the basis of the events discussed above, a separate investigation was conducted by OI in coordination with the Division of Human Factors Safety, NRR, to obtain additional information clarifying the involvement of Hawkins and Porter in changes to the Lucien Report. Specifically, the second investigation was aimed at determining if Hawkins and Porter were involved in efforts to change the Lucien Report in order to shift blame from the GPU Start-Up and Test Group or to "cover up" their individual responsibilities for the deficiencies identified in the Lucien Report. OI Lucien at 1, 2.

According to Porter, he was not pleased with the Lucien Report. Porter was concerned that Lucien conducted the investigation and drew conclusions about the Start-Up and Test Department, as a whole, and the people involved without ever talking to them. Porter also believed there was additional information available that was not taken into consideration by Lucien. This information included (1) additional test records, (2) additional testing performed by Multi-Amp Testing Service Corporation, (3) additional information regarding the bases for instrumentation set points, and (4) postaccident modifications that were performed on some equipment before Lucien's investigation. OI Lucien Ex. 4 at 12, 13. Porter testified that his only motive for wanting to meet with Lucien was to point out errors in the report and to make Lucien aware of the additional information that may not have been considered (Id. at 27). Porter was not concerned that he would be held personally responsible for the problems identified in the Lucien Report (Id. at 23, 24). Porter had no personal responsibility for any of the testing addressed within the scope of the Lucien Report (Id. at 7-9). When questioned regarding Lucien's statement "that the Met-Ed people who attended the meeting were trying to get him to shift some of the blame away from the Start-Up Group," Porter stated that his intent was to point out to Lucien the additional information and mistakes in the report. He thought that if Lucien really understood the program and became familiar with the rest of the records maybe Lucien would have a different opinion. Id. at 27, 28. Porter testified that following the meeting with Lucien there was no followup on his part to determine what action was taken by Lucien (Id. at 29). Porter had not seen the revised Lucien Report until a few days before his initial OI interview in February 1984 (Id. at 25).

Hawkins testified that his purpose in wanting to meet with Lucien in December 1979 was to point out additional information that was available even though it did not appear to have been taken into consideration by Lucien (OI Lucien Ex. 2 at 50-52). Hawkins admitted that he did take Lucien's comments personally and professionally. Hawkins felt that Lucien formed his negative opinions about the startup test program without all the facts and without talking to anyone involved. Id. at 59. Hawkins stated that he did not have a problem with Lucien having found mistakes. Mistakes were made and Hawkins did not try to convince Lucien otherwise. Hawkins said, "Our big problem was that he made us to be a bunch of sleazy, slippery test organization that was just running rampant without any programs or policies." Id. at 60.

When questioned as to whether his meeting with Lucien was motivated by the fact that he was concerned that he would be blamed for the problems identified by Lucien, Hawkins said that he was not concerned with that. The Start-Up Group previously identified many problems that were documented and routed to upper management personnel. The program was run in accordance with the original policies set up and approved by management. Id. at 64-68. The specific component tests, with which Lucien had found fault, were principally within the scope of responsibility of UE&C. Thus, in accordance with approved policy, Hawkins was not responsible for reviewing those contractor's tests (Id. at 93). Hawkins portrayed Lucien as having an arrogant attitude at the December 3rd meeting and believes that Lucien was offended by their comments on the report because they appeared to challenge Lucien's integrity and professionalism. Id. at 88.

Hawkins' testimony confirmed Porter's; there was no followup on their meeting with Lucien. When Lucien left the meeting, Hawkins was not aware of what Lucien intended to do about their comments. Hawkins did not know until shortly before his interview with OI that Lucien had revised the report based on the meeting. Id. at 69. Hawkins did not disagree with all of Lucien's findings; in fact, according to Hawkins, changes were made to the startup and test program as a result of problems identified by Lucien (Id. at 60, 85, 86).

9.3 Staff Findings

The OI investigation produced evidence that there were actually three versions of the Lucien Report. The original document produced by Lucien is dated September 1, 1979 (OI Keaten Ex. 47). The first revision was made by Lucien following a meeting with three Met-Ed employees on December 3, 1979. As a result of an administrative error, this revision is also dated September 1, 1979 (OI Keaten Ex. 48). The second revision also was made by Lucien after he received the followup test results that were recommended in his initial report. This second revision serves as the final report and is dated April 17, 1981 (OI Keaten Ex. 49).

The reference to a July 1980 version of the Lucien Report in the final Keaten Report was apparently an error. Since the final version of the Lucien Report post-dated the final Keaten Report, it appears that the subsequent revision referenced in the Keaten Report was actually Lucien's first revision dated September 1, 1979 (OI Keaten Ex. 48). OI Keaten at 66.

Changes did take place in the Lucien Report between the original version and the first revision dated September 1, 1979. The net result of these changes "softened" or "watered down" some of Lucien's original criticisms of the way testing was performed by the TMI-2 startup and test organization. It is significant to note, however, that the tone and substance of the revised Lucien Report is still very critical of the startup and test organization and the operability of the condensate polishing and condensate systems. The OI investigation identified the three Met-Ed employees who were instrumental in bringing about those changes as T. Hawkins, I. Porter, and S. Kakarla (OI

Keaten at 67). Hawkins is currently the Manager of Start-Up and Test for TMI-1. Before commercial operation of TMI-2, Hawkins was the Assistant Test Superintendent for TMI-2 Start-Up and Test. OI Lucien Ex. 2 at 4, 20. Porter is currently Start-Up and Test Manager for TMI-1 (Hawkins' assistant). Before commercial operation of TMI-2, Porter was Lead I&C and Electrical Engineer for TMI-2 Start-Up and Test. OI Keaten Ex. 44 at 3, 4. Kakarla is currently employed by UE&C and is no longer associated with TMI. From April 1970 until June 1978, Kakarla was assigned to the UE&C Start-Up and Test Department at TMI-2. At the time Kakarla reviewed the Lucien Report and met with Lucien on December 3, 1979, Kakarla was employed as a Senior Engineer with Met-Ed. OI Keaten Ex. 46 at 3.

Because Hawkins and Porter are currently in key management positions with respect to the safe operation of TMI-1, the staff review of changes to the Lucien Report concentrated on the motivation of Hawkins and Porter in meeting with Lucien on December 3, 1979. Specifically, the staff sought to determine whether Hawkins and Porter were involved in an attempt to make changes to the Lucien Report in order to try to improperly shift blame away from the Start-Up and Test Group or to cover up their responsibility for the problems identified by Lucien. OI Lucien Ex. 6 at 2.

Hawkins was upset with the opinionated nature of the Lucien Report. Hawkins admitted that he took Lucien's negative comments about the startup and test program personally and professionally. OI Lucien Ex. 2 at 59. Hawkins felt that Lucien had many misconceptions about the startup and test program because of the way he had conducted his investigation (OI Keaten Ex. 45 at 6, 7). Because Lucien had conducted his investigation without talking to the people who were involved in the startup and test program, Hawkins was aware of additional information that did not appear to have been considered by Lucien in developing the report (OI Lucien Ex. 2 at 50, 52). Hawkins believed that if Lucien had talked to the people involved in the program, he would have discovered the additional information (Id. at 45).

Hawkins stated that his purpose in meeting with Lucien on December 3, 1979, was to point out to Lucien additional test records and other information were available and to clear up what Hawkins believed were misconceptions on Lucien's part about the policies and procedures that were in effect during the startup and test phase at TMI-2 (OI Keaten Ex. 45 at 13, 23-25). Hawkins was not concerned that he would be held personally responsible for the deficiencies identified in the Lucien Report (OI Lucien Ex. 2 at 68, 80). The problems associated with component testing, which were pointed out by Lucien, were not his responsibility. Component testing was the responsibility of UE&C. Hawkins was responsible for system level functional testing. He was not charged with reviewing test records or actual testing performed by UE&C. Id. at 26-37, 93. On the basis of a review of the test procedure and test manual identified by Hawkins, it has been established that his responsibilities were to implement those policies and procedures. OI Lucien Ex. 6 at 3.

During Hawkins' meeting with Lucien, Hawkins discussed the additional information with Lucien as well as identifying some of the additional test records available to support his contention that some of the allegations made by Lucien were not based on all of the available facts (OI Lucien Ex. 2 at 79, 87). Hawkins did not dispute the fact that there were acknowledged deficiencies in hardware and in the startup and test program that did not preclude these deficiencies from occurring. Testimony provided by Lucien and the limited number of changes that were made to the report following the meeting indicate that there was no dispute between Hawkins and Lucien on factual issues. OI Lucien Ex. 1 at 4-8; Ex. 2 at 52, 53, 64.

Following their meeting, Hawkins did not attempt to contact Lucien again or to follow up in any manner to determine what action, if any, Lucien had taken as a result of his comments. Hawkins was not aware, until preparing for the interview with OI, that Lucien had revised his report as a result of their meeting. OI Lucien Ex. 2 at 83; Keaten Ex. 45 at 26.

Hawkins' explanation of the circumstances that led up to his meeting with Lucien is credible. On the basis of the items that were discussed at the meeting and the changes that resulted, coupled with Lucien's explanation of why the changes were made, the staff finds that the evidence does not support a finding of improper motivation or influence on the part of Hawkins. Much of the testimony presented by Porter confirmed what Hawkins had stated. Porter was not involved in any of the testing that was called into question by Lucien (OI Lucien Ex. 4 at 7). Nevertheless, Porter was aware of additional information and test records that led Porter to believe Lucien had not identified all of the facts before reaching his conclusions. Porter's motive for wanting to meet with Lucien was to bring this information to Lucien's attention. Id. at 12, 13. Porter believed that once Lucien talked with them and they were able to clear up some of the misconceptions and present Lucien with additional test records and other information, Lucien's opinion may have changed (Id. at 24, 28). Porter also confirmed that there was no attempt on the part of Met-Ed to rewrite Lucien's report. They would present him with those facts and let Lucien make up his own mind. Id. at 36.

Porter's testimony substantiated Hawkins' statements that there was no follow up with Lucien or any other individual after the December 3, 1979, meeting (Id. at 28, 29). Porter also was not aware that Lucien had revised the report following the meeting, until he was preparing for his interview with OI (Id. at 25).

Porter's explanation of the circumstances leading up to the meeting with Lucien is essentially the same as Hawkins' explanation. The staff finds no reason to disbelieve Porter's statement that there was no motive of personal concern on his part in terms of being held accountable for any of the problems identified by Lucien. The facts identified in the OI investigation support a finding of no improper influence or motivation on the part of Porter.

Kakarla's principal purpose for wanting to meet with Lucien was to assure that Lucien understood the sequence of testing that was approved at the time the testing was accomplished and to assure that Lucien was aware of some of the postaccident modifications that had been made to the condensate pump and condensate booster pump breakers (OI Keaten Ex. 46 at 6, 10). According to Lucien, Kakarla's role in the meeting was minor (OI Lucien Ex. 1 at 4). Kakarla confirmed that Hawkins and Porter did not try to get Lucien to change his report (OI Ex. 46 at 10, 15). Kakarla stated that they only brought facts to Lucien's attention. It was up to Lucien to take the comments or not (Id. at 16). Kakarla also confirmed that the only time the meeting became "heated" was when Hawkins and Porter thought some of the editorial comments written by Lucien were not supported by facts (Id. at 29).

In summary, on the basis of the evidence presented in OI's investigation of changes to the Lucien Report, the staff concludes that the circumstances and events surrounding the December 3, 1979, meeting and the resultant changes to Lucien's original September 1, 1979, draft report do not raise questions concerning the integrity of Hawkins, Porter, or Kakarla. In addition, these changes were made by Lucien as a direct result of his meeting with Hawkins, Porter, and Kakarla. None of the individuals involved were instructed by GPU or Met-Ed management to make these modifications and there is no evidence that any member of GPU or Met-Ed management was involved in seeking modifications to the Lucien Report.

10.0 ALLEGED HARASSMENT OF PARKS, KING, AND GISCHEL

10.1 Background

The Energy Reorganization Act of 1974 (42 U.S.C 5851) and the Code of Federal Regulations, Title 10, Section 50.7 (10 CFR 50.7), protect employees who raise issues of health and safety. It came to the attention of the NRC that the possibility existed that three employees who raised such concerns (R. D. Parks, L. King, and E. Gischel), may in fact have been victims of harassment, intimidation, or retaliation for having engaged in protected activities related to cleanup operations at TMI-2. These individuals raised health and safety concerns primarily related to the refurbishment of the TMI-2 polar crane. Parks, a Bechtel employee, was placed on leave of absence with pay and prohibited entry to the jobsite by Bechtel. King was fired from his position as TMI-2 Site Operations Director. Gischel, TMI-2 Plant Engineering Director, was allegedly harassed about taking a neuropsychological examination. Each of these individuals had complaints that will be dealt with separately in this report.

OI was asked to conduct an investigation into these matters.

10.2 Investigation Results

10.2.1 R. D. Parks Investigation Results

R. D. Parks was hired on May 24, 1982, by Bechtel North American Power Corporation (Bechtel) as a Senior Startup Engineer in the Startup Engineering Department at the TMI jobsite (May 18, 1984, OI Report Ex. 102 at 1). Parks was assigned as an Operations Engineer in the Site Operations (SO) Department, headed by King*, who appointed Parks as the primary SO Department representative on the Test Working Group (TWG). OI found that "Parks' duties included oversite and review of plant modification and new systems, and interfacing with task groups to ensure compliance with standards, operational capabilities, and NRC rules. . . . Parks' selection by King for this work involved, King states, 'Parks integrity.'" Id.

Beginning in November 1982, site operations participated in the interdepartmental group (Head Lift Task Force) responsible for planning the removal of the reactor vessel head. The polar crane project completion was on the critical path for removal of the reactor vessel head. A question arose as to whether the polar crane, having been turned over to Bechtel for repair, was a project requiring SO's overview in the process of repair (Id.).

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*A combined GPUN and Bechtel organization was functioning to support TMI-2 cleanup operations. The Site Operations Department reported to Director TMI-2, a Bechtel employee (B. Kanga).

In February 1983, NRC approval was sought to use the polar crane to verify the radiation level under the reactor head. Because of engineering deficiencies, Parks and other members of the SO Department had objections to using the polar crane. Parks refused to approve the proposed licensee safety evaluation report (SER). Id.

On February 11, 1983, King and Gischel had a meeting with B. Kanga to discuss approval of the recently drafted polar crane SER. King and Gischel stated that they had significant problems with the whole polar crane program and also refused to approve the SER. September 1, 1983, OI Report Attachment D-2 at 18.

As a result of raising his concerns about the polar crane, Parks was requested to attend a meeting on February 22, 1983, with Kanga. Parks asked King to go with him. Id. at 21. During this meeting Parks again outlined his concerns about the polar crane (Id.). These safety concerns were first raised by Parks in November of 1982 (Id. at 4).

Parks felt he was discriminated against in his employment because he had raised these safety concerns. Parks outlined his complaints to the Department of Labor (DOL). May 18, 1984, OI Report Ex. 102 at 2.

Parks had four specific complaints of harassment:

1. On February 23, 1983, he was informed he had been relieved of his duties as Alternate Startup and Test Supervisor at TMI-Unit 2.
2. On March 14, 1983, he was interrogated by a Bechtel executive and an internal auditor as part of an investigation into violations of alleged employee conflict-of-interest standards.
3. On March 17, 1983, he was replaced as the primary SO Department representative on the TWG for the Reactor Building Polar Crane Project.
4. On March 24, 1983, he was placed on leave of absence with pay and prohibited entry to the jobsite without permission from Bechtel. Id.

Parks felt that the harassment began as early as January 1983 when T. Morris, the Acting Chairman of the Head Lift Task Force, said after a meeting that Parks should be counseled for his negative attitude (September 1, 1983, OI Report Attachment D-2 at 8). On February 18, 1983, E. Kitler, Supervisor of Startup and Test, advised Parks that upper management was upset with him and they had asked Kitler what had to be done to get Parks transferred off the site. Immediately after this conversation, Parks met with King and Kitler and repeated the statements that had been made to him. Id. at 20.

At a widely attended meeting, held on February 23, 1983, to discuss the Polar Crane Refurbishment and Test Program, Parks stated that as alternate Startup and Test Supervisor, he was still responsible to identify potential quality assurance deficiencies. At this point J. Thiesing, Manager of Recovery Programs, informed Parks that he no longer had to worry about that. A memorandum had just been issued appointing a new alternate, thus relieving Parks. May 18, 1984, OI Report 102 at 3.

On March 14, 1983, Parks attended a meeting with his administrative supervisor, R. Wheeler, and L. Hoffman of the Bechtel Internal Auditing Group (September 1, 1983, OI Report Attachment D-2 at 47). Wheeler was from Bechtel's Gaithersburg (Maryland) Office. Parks asked if he could have a copy of their notes after the interview was over. Wheeler and Hoffman replied that he could not, stating that this was not Bechtel procedure. Parks said it was not his procedure to talk one on two, especially in light of the recent threats he had received (Id. at 48). Parks wanted an impartial witness present. Later on March 14, 1983, Parks was interrogated with M. Kobi of Bechtel present as an impartial witness. Parks said that the main topic of discussion was his alleged involvement with Quiltec (a consulting firm engaged in nuclear industry support in which King was president). Parks stated that he had no involvement with Quiltec, other than a peripheral contact through his friendship with King. He explained finding an onsite typist for King to do some after-hours typing for Quiltec. Parks said that Kobi later remarked that the way the meeting was handled was "not the Bechtel way" and that he too felt Parks was "being set up." May 18, 1984, OI Report Ex. 102 at 5.

During the course of the DOL investigation, C. Hrbac, a Chemical Engineer employed by GPUN, "stated his belief that the full-scale investigation of Parks for his alleged connection with Quiltech [sic] was an act of intimidation against Parks." (Id. at 6).

Parks met again with Hoffman and Wheeler (March 15, 1983), but this time the meeting included C. Sanford, a corporate Vice-President from Bechtel's Gaithersburg Office. During this meeting, Parks told Sanford as many of his safety concerns and the threats made against him as he could remember. September 1, 1983, OI Report Attachment D-2 at 49. According to Parks, Sanford "did not appear to be interested. . . . Sanford did state that Bechtel does not tolerate intimidation of its employees." Id. During the meeting, Sanford accused Parks of aiding and abetting King's efforts to steal GPU employees for personal gain. Sanford added that he had not set a date to pass judgment on the issue, but Parks could be fired for his alleged involvement. Id. at 50.

Parks delivered a letter to Sanford on March 16, 1983, through Kanga's office, concerning their discussion. The letter stated that Parks shared management's concerns regarding conflict of interest and that Parks had not sought or received any financial gain from Quiltec and that he pledged he would not. Parks asked for some written description of employee standards on conflict of interest since he had not received any indoctrination program when hired. Parks offered to reconsider his safety concerns if Bechtel would explain in writing why he was mistaken. Finally, Parks asked for a written pledge that the intimidations cease. September 1, 1983, OI Report Attachment D-2 Ex. 1.

Kanga called Parks to his office on March 17, 1983, for a meeting that lasted 2 1/2 hours, concerning the letter to Sanford. Parks told Kanga that he had still not received a satisfactory response to his concerns about the polar crane. Kanga warned Parks not to state his concerns publicly. September 1, 1983, OI Report Attachment D-2 at 51. Parks said "he [Kanga] said that once before things had gotten much worse for an employee who had tried that and was 'humiliated.' He [Kanga] said it could be as long as two weeks before any decision was reached on me [Parks] about Quiltec" (Id.). Kanga told Parks that Parks had put Bechtel in a bad light with a client and, therefore, Parks stood a good chance of getting fired (Id.).

Later on the afternoon of March 17th, Parks was called back to Kanga's office for a meeting that included J. Chwastyk, GPUN's Manager of Operations at TMI-2. During this meeting, Parks received a memorandum dated March 17, 1983, from Chwastyk, informing him that, effective immediately, he would be replaced as the primary site operations member on the TWG for the reactor building polar crane project. Id. at 52.

Bechtel representatives from the Gaithersburg Office visited Parks on March 22, 1983, to report that Parks had been exonerated on the Quiltec matter and that he could remain at TMI as long as he wished. Further, these representatives assured Parks that no "further reprisals" would occur and asked for a list of his safety concerns. May 18, 1984, OI Report Ex. 102 at 8.

According to Parks, just after this meeting on March 22, 1983, Kanga asked him to report to his office where Wheeler (Bechtel's Chief Startup Engineer and Park's supervisor) and a public relations officer, Bedell, were present. At this meeting, Bedell asked Parks if he had a news conference scheduled for the next day; Parks confirmed that he did and that he was filing a Department of Labor (DOL) complaint. This was his first disclosure of that fact to Bechtel. Id. at 8.

On March 23, 1983, Parks held a press conference and released his affidavit concerning the polar crane and related safety concerns. On March 24th, Parks was sent a letter from Wheeler in which Wheeler acknowledged being informed of Parks' DOL complaint about harassment and intimidation and denied its occurrence (Id. at 8, 9).

The letter also stated: "In order to insulate you from even the appearance of such conduct and to assure the continued effectiveness of all personnel at the site, we are placing you on an indefinite leave of absence with pay, effective immediately, until we have had the opportunity to review this matter further." Id. at 9.

In his presentation to the DOL, Bechtel's attorney said:

> Parks made grave accusations concerning the professional competence and integrity of several of his coworkers and colleagues at TMI. . . . these accusations to public news media. . . have caused severe harm to the individuals involved. . . . Parks had lost his ability to function as a member of a professional organization on this project. Id.

The DOL investigator took note of the fact that before the beginning of the polar crane controversy and Parks' involvement therein, Parks had received a performance evaluation on August 27, 1982, indicating he met or exceeded all job requirements. Among the "exceeds" categories were job knowledge, flexibility, cooperation, client relations, initiative, and problem analysis. Overall he was rated "Exceeds Requirements." Id. at 1.

The DOL investigation found (1) the four claimed discriminatory actions occurred over a 4-week period between February 23 and March 24, 1983, and (2) the four actions were progressive in nature:

> [L]osing his voice and input as alternate startup and test supervisor for the entire Unit [2]; being subjected to an examination involving the West Coast main office internal audit staff over a seemingly minor infraction of a work conflict rule he had not been made aware of; being dropped as the Site Operations lead man on the Test Working Group for the very project he was most concerned about; and finally being suspended from his job, albeit with pay, the day following his filing of his whistleblower complaint and his press conference on the event. Id. at 11.

DOL found that there existed "such a concentration of complaints to authority and of claimed discriminatory actions, of such immediacy of occurrence, and of such cumulativeness of impact that in reality most of the aspects of the complaint were related to most of the aspects of discrimination. The necessary causal connections are of a network nature." Id.

Further, DOL found that the timing of Parks' suspension, a day after his public filing of the complaint about the polar crane and related safety issues, was a clear instance of causal connection. "Mr. Gischel's description of the large staff meeting to decide on a reaction to Parks' complaint, ranging from firing to suspension, shows that the fact that the complaint was filed is at least a factor in the suspension from duty that was announced that day." Id. at 13.

About March 23, 1983, after Parks had filed his DOL complaint and publicly stated his concerns about the polar crane, Arnold (President, GPUN) called a meeting attended by Kanga (Director TMI-2, Bechtel), Barton (GPUN), other Bechtel people, and the entire senior staff of the integrated GPUN/Bechtel management team--about 25 to 30 people. During this meeting, Barton became angry and recommended firing Parks. A discussion was held about restricting Parks' activities; they decided, during the meeting, to suspend Parks with pay. Id. at 9; Id. Ex. B-2 at 5.

On the basis of its investigation, DOL recommended that Parks be granted relief and that Bechtel take remedial action consisting of the following:

1. Refraining from taking any actions which prevent Mr. Parks from engaging in activities protected by the law.

2. Reinstatement of Mr. Parks to his position and duties as they existed prior to February 23, 1983.

3. Expunging from all Bechtel records and files of any references characterizing Mr. Parks' actions or behavior as being inappropriate in this matter.

4. The payment of all costs and expenses (including attorney's fees) reasonably incurred by Mr. Parks in connection with the bringing of his complaint.

Id. at 13.

10.2.2 L. King Investigation Results

L. King was employed at GPUN as the Plant Operations Director beginning in 1980. On July 23, 1981, King and associates (B. J. Slone, J. M. Hoade who is King's stepson, and G. King who is King's wife) incorporated in Virginia a corporation called Quiltec, Inc. At the time of incorporation, Slone and King worked at TMI for GPU; however, on June 7, 1982, Slone began working for Quiltec. Later in 1982, two other GPUN employees, Herlihy and Rekart, went to work for Quiltec, on October 4 and 11, 1982, respectively (May 18, 1984, OI Report Ex. 60 at 2).

Quiltec provided engineering services to nuclear power plants. Its initial contract was with Long Island Lighting at the Shoreham Nuclear Station (Id. Ex. 62 at 4-5). On October 28 and 29, 1982, J. Chwastyk, Manager of Plant Operations at TMI-2, went to the Beaver Valley Nuclear Power Plant as a representative of Quiltec (at the direction of King) and made a presentation with Hoade of available Quiltec services (Id. Ex. 61 at 35-40).

On November 12, 1982, K. Lionarons (a GPUN employee) told King that he was sick of working at TMI and wanted to get out. During that conversation, King indicated the possibility of working for Quiltec either with Slone at Shoreham or at Beaver Valley (Id. Ex. 65 at 19); King outlined to Lionarons the various benefits, pension plans, and other aspects of employment with Quiltec. King additionally told Lionarons that there was much overtime at Shoreham and there was also the possibility of working in a coal plant in Florida for Quiltec (Id. at 21). In December 1982, King called Lionarons--who then was working directly for King--into his office and asked if he was interested in doing some work in Louisiana. Soon after this conversation, King arranged for Lionarons to travel as a representative of Quiltec and to go to a meeting with representatives of various firms in New Jersey (Id. at 22, 23). Soon after returning from the meeting in New Jersey, Lionarons submitted his resignation to GPUN (Id. at 24). After submitting his resignation and giving his 2-week notice, Lionarons performed work for Quiltec while remaining on the GPU payroll at TMI (Id. at 25). Lionarons also submitted his expenses for this work to Quiltec at King's instruction (Id. at 27).

On November 15, 1982, W. Austin, a senior engineer at TMI-2, happened to hear that Slone, Rekart, and Herlihy were working at the Shoreham Nuclear Power Plant. At that time however, Austin had no knowledge that these three men were associated with Quiltec. When Austin returned to TMI, he passed this information on to his boss D. Buchanan (Id. Ex. 63 at 8, 9). During a New Year's Eve party at Reckart's home (December 31, 1982), Buchanan (TMI-2 Manager of Site Engineering) was told by Reckart that he, King, Slone, and Herlihy were all involved with Quiltec (Id. Ex. 64 at 34). Buchanan made a conscious decision not to pass the information on to his supervisor J. Thiesing (Manager TMI-2 Recovery Program and a Bechtel employee) because Buchanan felt the working relationship between the Site Operations and the Recovery Program people was difficult enough and he did not want to make matters worse (Id. Ex. 64 at 36).

During the second half of 1982, Thiesing heard rumors that Slone, when he left GPUN, was going to take a job associated with King in some sort of business arrangement (Id. Ex. 66 at 4). When Herlihy left GPU and refused to say where he was going, it was rumored that he was going to join Slone in a business venture that involved King. Id. at 4, 5. Shortly after Herlihy left, T. Rekart was transferred at King's request from Site Engineering working for Thiesing to Plant Engineering working for King. About a month later, Rekart resigned from GPUN (Id. at 5). At about this same point in time, King requested the transfer of Lionarons from Site Engineering to Plant Engineering. Shortly after his reassignment, Lionarons submitted his resignation to GPUN. Rumors existed that Lionarons also might be going to work for Slone and Herlihy in the business in which King allegedly had an interest (Id. at 5, 6).

On February 2 or 3, 1983, Thiesing went on a business trip with Austin. During this trip, Austin expressed his concern that Rekart had taken a job in an organization in which King had an interest. Austin felt this presented a serious problem because GPUN was losing engineering talent to an organization that King may be involved with. Austin felt management should take some action (Id. at 6, 7). Thiesing, however, still felt the stories about King were rumor (Id. at 7). Nonetheless, he promised Austin that he would look into the situation and get back to him (Id. at 8).

On February 7, 1983, King sent P. Clark (Vice-President, GPUN) a handwritten note asking for a meeting to discuss King's concerns about operations at TMI-2 (Id. Ex. 67). Clark met with King several times during the previous 6 months on various matters of concern to King (Id. Ex. 68 at 31). Clark checked with R. C. Arnold and B. Kanga and became aware of the fact that some of the staff at TMI-2 were raising issues regarding the polar crane and its load testing (Id. at 36). When King met with Clark, King did not raise any safety issues. He was interested in discussing other positions within GPUN because he was unhappy with the way things were going at TMI-2 and he felt he might want to take another job (Id. at 38).

About the middle of February 1983, Thiesing requested that the Bechtel procurement office in Gaithersburg, run a vendor information and qualification survey on Quiltec. On February 22, the Bechtel procurement office informed Thiesing that the president of Quiltec was L. King, the vice-president was B. Slone, the business agent and treasurer was J. Hoade, and that a Mrs. King also was an officer of the corporation. Id. Ex. 66 at 19-21.

J. Buhl, Bechtel's Project Procurement Officer, said he did not feel it was appropriate for Bechtel procurement to do a background investigation on a firm for determining a conflict of interest (Id. Ex. 72 at 24, 25). H. Bruner, Thiesing's supervisor within Bechtel, did not feel Thiesing had violated any Bechtel policy or procedure since in the normal course of events in Thiesing's position in the integrated organization, he would have been the best person to have transmitted the information discovered about King to GPUN (Id. Ex. 74 at 12-15).

Thiesing subsequently informed Barton about King's involvement with Quiltec. Id. Ex. 40 at 14. On February 24, Barton and Thiesing had a discussion with Kanga about the King/Quiltec situation. Thiesing then had no further involvement with the King/Quiltec affair (Id. Ex. 66 at 26, 27).

Barton contacted GPUN's attorney, J. Wilson, to discuss King's possible conflict of interest (Id. Ex. 40 at 15). Kanga instructed Barton to notify either Arnold or Clark of the Quiltec issue (Id. Ex. 18 at 6).

Arnold became aware of King's connection with Quiltec on February 24th when Clark told him about the information that he had received from Barton. Arnold then called Barton and directed him to meet with King and J. Troebliger, Acting Manager of Resources, and obtain King's response to two questions (Id. Ex. 15 at 5-7). Barton and Troebliger met with King late on the afternoon of February 24. In response to these questions, King said that he was involved with an outside engineering consulting company and that the company had hired people previously employed with GPUN. On the basis of his answers to these questions, King was immediately placed on suspension without pay. Barton asked King to surrender his badge and escorted him to the north gate off the TMI site. Id. Ex. 40 at 6, 7; see also Id. Ex. 15 at 7, 8.

Arnold felt that King's suspension, on the spot, was appropriate because of the seriousness of the offense in that he had violated the most fundamental obligation he had to the company--protection of the resources given to King's care. As a result of violating this trust, Arnold felt King should be immediately suspended. Id. Ex. 16 at 111, 112.

Arnold based the accountability of King on three main points: (1) the GPUN conflict-of-interest policy statement (which has subsequently been made more explicit as a result of the King incident), (2) King's responsibility to develop staff and make productive utilization of the resources available to him, and (3) King's disregard of the importance of GPUN having a highly trained, technically competent staff (Id. Ex. 16 at 115-118). King said that Barton told him on February 24 that the investigation of Quiltec would be handled separately from any safety concerns King was raising (Id. Ex. 84 at 28). King expressed an unwillingness to meet with Clark on February 25th because he was suspended without pay (Id. Ex. 68 at 48, 49). On February 25, 1983, Arnold and Clark decided that King's suspension would be with pay to make certain that King would bring any safety concerns he had to GPUN's attention. The meeting on King's safety concerns took place later that day (Id. at 50).

On February 28, Arnold sent a letter to King inquiring why he did not inform GPUN of his association with Quiltec and asking further about Quiltec employment of former GPUN employees. King, in a letter dated March 9, 1983, stated: "As Quiltec, Inc. was set up, it specifically did not solicit engagements which could create a conflict of interest for me, nor did Quiltec, Inc. solicit the employment of G.P.U. Nuclear Corporation employees. Several employees of G.P.U. Nuclear Corporation, knowing Mr. Slone was a consultant to the nuclear industry, contacted him for employment, including Mr. Rekart and Mr. Herlihy. Under these circumstances I saw no conflict of interest." Id. Ex. 60 at 3.

King did not feel he was improperly recruiting GPUN employees because the individuals in question approached either him or Slone about employment; therefore, King did not feel he had done any improper recruiting (Id. Ex. 84 at 112). Both Herlihy and Rekart confirmed that they sought out employment with Quiltec by contacting Slone themselves (Id. Ex. 85 Attachments B-2, B-4). Also Lionarons approached King (November of 1982) to complain about what he viewed as lack of progress on TMI and the fact that he was sick of working there. Lionarons told King he would like to get out. According to Lionarons, it was not until this point in time that he was aware of how much involvement King had with Quiltec (Id. Ex. 65 at 19).

After receiving King's March 9 response to his questions on Quiltec, Arnold, in an attempt to determine who within the TMI-2 organization management structure was aware of King's association with Quiltec, talked to Austin, Buchanan, and Chwastyk. Chwastyk did not disclose to Arnold that he had traveled to the Beaver Valley Plant as a representative of Quiltec (Id. Ex. 89 at 68, 69).

Arnold contacted M. Pollack, Vice-President with the Long Island Lighting Company at the Shoreham Nuclear Station, and discussed the situation involving Quiltec. It became clear to Arnold that Quiltec had arranged the employment of at least two GPUN employees at Shoreham before these employees informed GPUN that they were going to resign (Id. Ex. 16 at 121).

On March 16, 1983, Arnold wrote to King:

> As a result of your failure to inform GPUN of your position as President of Quiltech [sic], Inc. and the fact that Quiltech [sic] has hired at least two GPUN employees from GPUN, your employment with GPUN is being terminated as of March 23, 1983.
>
> The date of termination has been set on the basis that you will continue to cooperate in the company's review of the concerns you have expressed regarding potential safety issues at TMI-2. Id. Ex. 58.

Arnold stated that he did not understand the depth of the disagreement between various members of the TMI-2 staff and he did not reflect in any prolonged way as to whether or not the suspension of King would be misunderstood by members of the organization as being retaliation or harassment of King because of his concern about safety issues (Id. Ex. 16 at 126, 127).

10.2.3 E. Gischel Investigation Results

E. Gischel, the GPUN Plant Engineering Director at TMI-2, reported directly to the Site Operations Director, L. King (September 1, 1983, OI Report Attachment D-5 at 1). In June 1982, Gischel suffered a stroke that kept him out of work until October. The stroke affected his vision and short-term memory (Id. at 6). As a result of the stroke, Gischel, on the recommendation of a friend, began consulting with Dr. W. Jenkins, a psychologist employed by an organization called Corporate Stress Control Services, Inc., in Middletown, Pennsylvania (May 18, 1984, OI Report at 14). Gischel had his first appointment with Dr. Jenkins on October 12, 1982 (Id. Ex. 3 at 12). During this visit, Gischel was told by Dr. Jenkins to take a neuropsychological examination so that the doctor could fully evaluate his condition (Id. at 13). Gischel told Dr. Jenkins that he thought it was a good idea, but wanted to discuss it with his wife (Id. at 14). Gischel signed a release on October 26, 1982, for Dr. Jenkins to submit information to Dr. Gordon who would perform the neuropsychological evaluation scheduled for December 13, 1982 (Id. at 18).

On November 18, 1982, Dr. I. Imber of Reading, Pennsylvania, performed a company annual physical on Gischel. Gischel was found fit for work (Id. Ex. 7).

As a result of a visit to the emergency room on December 6, 1982, because of dizziness, Gischel was referred to Dr. R. Jones who was an internist. Dr. Jones treated Gischel for hypertension (Id. Ex. 6 at 1).

On January 15, 1983, Dr. Jenkins found that Gischel did not take the neuropsychological examination that had been scheduled for December 13th (Id. Ex. 3 at 18). During a mid-January 1983 telephone conversation, Dr. Jenkins told Gischel that he felt GPUN should be brought into the discussions regarding the neuropsychological examination (Id. Ex. 14 at 1). On February 2, 1983, Dr. Jenkins again told Gischel that he should take the neuropsychological examination. Gischel said he would if GPUN requested it and paid for it (Id. Ex. 3 at 19). During this conversation Dr. Jenkins told Gischel that if GPUN was asked to pay for the examination, they then would know that Stress Control wanted Gischel to take the examination. Dr. Jenkins got the feeling that Gischel felt the information about his attendance at the clinic had already been divulged to GPUN (Id. at 20).

Because of Mr. Gischel's continued refusal to take the neuropsychological examination, Dr. Jenkins decided to contact his supervisor in New York, Dr. Howard Glazer, who suggested a letter be sent to Gischel (Id. Ex. 3 at 21, 22). On February 10, 1983, Dr. Jenkins wrote Gischel a letter urging him to take the neuropsychological examination. Dr. Jenkins asked Gischel to make a decision and notify the doctor's office within 2 weeks (Id. Ex. 8).

On approximately February 15, 1983, Dr. Glazer advised T. Meyers (the GPUN Director of Human Resources) of his continuing concern about an employee's unwillingness to comply with the request for a neuropsychological evaluation and of Dr. Jenkins' concern that under the circumstances, this employee should not retain his unescorted access (Id. Ex. 11 at 38, 39). Meyers called Dr. Glazer back and identified the employee as Gischel; Dr. Glazer confirmed that Gischel was the person (Id. at 39).

Gischel spoke with Dr. Jenkins (on approximately February 17) about the February 10th letter. Dr. Jenkins again told Gischel that it was important he have the test done and that, if he should refuse to take the test, Dr. Jenkins would be forced to notify GPUN (Id. Ex. 2 at 11).

During a visit on February 28, 1983, Dr. Jones strongly urged Gischel to take the neuropsychological examination (Id. Ex. 6 at 2).

On March 9, 1983, Dr. Glazer told Meyers, in their third conversation, that Gischel was not making progress towards taking the neuropsychological examination. Meyers indicated that he would discuss the matter with Arnold, the President of GPUN, because of the sensitive nature of the activities at Three Mile Island (Id. Ex. 13 at 16). After he had been apprised of the situation by Meyers, Arnold asked that Stress Control contact him personally (Id. Ex. 15 at 57, 58).

On or before March 16, Arnold talked to Dr. Glazer about Gischel's medical condition (Id. Ex. 9 at 24, 25). Arnold, after this discussion with Dr. Glazer, agreed that Gischel needed the neuropsychological examination (Id. Ex. 16 at 36). A meeting was later held on March 16, 1983, between Arnold, Kanga, and Gischel to tell Gischel that GPUN would make the arrangements for him to take the neuropsychological examination, which GPUN would pay for. During this meeting, Arnold told Gischel that perhaps it would be necessary to make a temporary adjustment in his work assignment, although GPUN had no intention of putting Gischel on a leave of absence or ending his employment (Id. Ex. 15 at 68, 69). Gischel reluctantly agreed to take the examination (Id. at 71). (This conversation took place before Parks' press conference of March 23, 1983, concerning the polar crane and related safety issues in which Gischel and King are identified as supporters of Parks' concerns.)

On March 28, 1983, Gischel sent a letter to Arnold telling him that his personal physician, Dr. Jones, saw no value in Gischel taking the neuropsychological examination. Gischel requested the examination be cancelled, unless it was a condition of his continued employment at GPUN (Id. Ex. 20). Arnold and Gischel met to discuss this letter on March 29. According to Gischel:

> [Arnold] glossed over whether the evaluation is a condition of my employment. He said he didn't like to think of it in those terms. . . .Mr. Arnold told me that he did not have any problems with someone besides Dr. Gordon conducting the evaluation, but there had to be some assurance that whoever did the job was qualified. I stated that he should state the necessary qualifications standards and I would seek a highly-qualified professional who meets them. I told Mr. Arnold that I would base my selection on professional competence and independence from GPUN. Mr. Arnold said he would get back to me, perhaps by Monday, April 4th. Id. Ex. 1 at 19.

Arnold wrote a memorandum, April 4, 1983, to Gischel outlining the three qualifications necessary for an individual to administer and interpret the neuropsychological evaluation that "the Company has requested that you take." Id. Ex. 21. On April 13, 1983, Gischel sent a memorandum to Arnold telling him that he had discontinued his efforts to locate an independent professional to administer the neuropsychological evaluation because Arnold had not notified him that the examination was a condition of employment as Gischel had requested in his memorandum of March 28, 1983 (Id. Ex. 22). On April 14, Arnold sent Gischel a letter telling him that "I have decided that having the evaluation is a condition for continuation of your present assignment" (Id. Ex. 23 at 2).

In an attempt to resolve the matter of the neuropsychological examination, Arnold had W. Gifford, GPUN Vice-President for Communications, talk to Gischel. With Gischel's permission, Gifford then talked to Dr. Jones in an attempt to resolve the matter (Id. Ex. 16 at 51). However, despite these efforts, Arnold and Gischel continued to disagree on how to resolve the matter of the neuropsychological examination (Id. at 52, 53).

Arnold perceived himself as confronted with a dilemma: Dr. Jones was saying Gischel was basically fit to return to duty and the doctors at Stress Control were saying it was extremely important for Gischel to take this neuropsychological examination because they felt he was a danger to himself and others. Arnold therefore stated that he thought of the examination as a third party evaluation that would, in essence, be the tie breaker (Id. at 44, 45).

Until April 25, 1983, Gischel continued to believe that Arnold would accept a letter from his doctor "attesting to my suitability to work in my present position," if the letter adequately addressed the issues (Id. Ex. 14 at 2). As a result of his conversations with Gischel and Dr. Jones, Gifford drafted a letter for Arnold's signature to Dr. Jones (Id. Ex. 27). This letter outlined GPUN's concern with respect to Gischel's stroke as follows:

> a. Identification of any physiological, psychological or other effects which have implications as to Ed's ability to perform his normal work assignments.
> b. That the physiological or psychological impact of extended work hours, possible emergency stresses and highly technical supervisory tasks (as Ed's position would normally involve at various times) are likely to result in adverse effects either to Ed or to the performance of those tasks.
> c. Whether there is a need to adjust Ed's work assignments until he has achieved full recovery to facilitate the attainment of that full recovery.
> d. Whether there is any likelihood of memory loss, vision limitations or present or potential impairment of the mental processes involved with assimilating, understanding and acting upon written and oral communication or susceptibility to confusion. This also should relate to information received by Ed, either visually or orally, prior to the stroke.
> Id. at 2.

Because Arnold and Gifford would not be available later on April 25, Arnold asked J. Wilson, an attorney for GPUN, to take the draft letter to Gischel for his review, comment, and acceptance (Id. Ex. 28 at 4). According to Wilson, "Mr. Gischel took the letter and requested some time in order to read it, and said he would get back to me." Id. Later during the evening of April 25, Gischel called Wilson and made a connection between testifying at Congressman Udall's Hearings the next day and taking of the neuropsychological examination. Wilson indicated to Gischel that it was inappropriate to link the two together--they should not be tied together (Id. at 16). In a later conversation, Wilson advised Arnold of this. According to Mr. Wilson, "Mr. Arnold was explicit that I should make certain that Mr. Gischel understands that whether or not this is agreed to, if Mr. Gischel felt a need to testify or go to the Udall hearing, that he should do so. Because there was no connection between what we were trying to accomplish and that hearing." Id. Wilson again explained this to Gischel, who said he understood (Id.).

Dr. Jones wrote to Arnold on April 25, 1983, and said:

> [The] only defect I have found is also the visual field deficit. Specifically, I have noted no difficulties in assimilating visual or oral communication (nor would any be expected), language, memory, psychological or other mental status abnormalities. His hypertension has been under excellent control on medications. I have discussed Ed's case with the neurologist in Lebanon, [Pennsylvania,] and from a medical standpoint, no further evaluation has been deemed necessary. Id. Ex. 29.

Although the record is not clear as to when Arnold received this letter, it does not appear that the letter was in W. Kuhns' (Chairman of the Board, GPU) possession at the time of the April 27, 1983, GPU Board of Directors meeting (Id. Ex. 31 at 8). Also, because Arnold was out of town on April 25 and 26, it is unlikely that he received Dr. Jones' letter on either of those days (Id. Ex. 28 at 7).

Gischel made a presentation to the GPU Board of Directors at their April 27 meeting. As a result of the presentation, Kuhns was bothered by the fact that the Stress Control doctors had talked to GPUN before they had notified Gischel that they were going to do so. Kuhns thought this was a breach of privacy by Stress Control relative to Gischel. Id. Ex. 31 at 6.

Even though he was bothered by this breach of privacy, during the Board meeting on April 27, Kuhns told the Board and Gischel:

> [We] felt we had a problem, that we had been advised that he might have a psychological, physiological impairment as a result of his stroke that might evidence itself in ways that could compromise his ability to carry out his sensitive duties with GPU Nuclear, and that we felt we had to resolve that. . . .This is not a condition of employment, Mr. Gischel. We are not saying you have to take this test or you can't work with us. We are saying you have to take the test in order to stay in the spot you are in. We

> are making it a condition of that job. We are not saying that you are going to lose your job with the System, or that we are going to cut your salary or deprive you of your benefits or anything like that. We urged him-I urged him to take the test at that meeting. I said: We've got a problem with it, Mr. Gischel, and you, I hope, understand that we have been advised that you have a condition that reflects on your ability to perform your job. In our responsibility for the safety of this operation, we have to respond to that. And we ask you to take the test. And he finally said to me at the meeting: Okay, I will take the test if you, meaning me, pick the doctor or pick the expert. I said I would do that. Id. at 8, 9.

As a result of the April 27 meeting, Kuhns contacted Dr. H. Prystowski, head of the Hershey Medical Center, to seek his advice. Dr. Prystowski recommended Dr. Gordon at Johns Hopkins, Baltimore, Maryland, who had no apparent relationship to the doctor recommended at the University of Pennsylvania, although he had the same surname. Id. at 9, 10. Gischel wrote a memorandum on May 12, 1983, to Kuhns. Gischel said he was attempting to make arrangements to take the evaluation as required, but he felt that he was being threatened by Kuhns and that Kuhns was engaging in retaliatory actions against him. Id. Ex. 32.

On May 19, Kuhns wrote a letter to Gischel giving a chronology of Gischel's illness and subsequent dealings with Stress Control. Kuhns also outlined Gischel's unwillingness to take the neuropsychological examination. In the letter Kuhns told Gischel:

> I am again informing you that the company's receipt of assurance that your state of recovery is consistent with your job requirements is a condition of continuance in your current assignment. If we cannot be provided with reasonable assurance, you will be assigned to another job in GPU Nuclear, in the TMI area, and at your current salary until your recovery is effectively complete. As Mr. Arnold has stated, the company will cover all expenses for this evaluation. Id. Ex. 33 at 19, 2.

Also on May 19, 1983, Kuhns wrote another letter to Gischel in which he took issue with Gischel's allegations in his May 12 letter to Kuhns that Kuhns had engaged in harassment. Kuhns reiterates his thought that the taking of the neuropsychological examination was "not a condition of employment [but] it certainly was understood to be a condition precedent to your present assignment." Id. Ex. 34.

On June 17, 1983, in a memorandum to Kuhns, Gischel requested a transfer to the Reading, Pennsylvania, office (Id.. Ex. 35). Gischel's transfer to Reading became effective July 1, 1983 (Id. Ex. 14 at 8).

Gischel raised several other issues, besides the issue of the neuropsychological examination, that he claimed were indicative of management attempts to harass, intimidate, or take retaliation against him for his efforts to raise concerns about the Polar Crane Refurbishment Program. Among these were the manpower, overtime, and contractor issues; the PER-8 account issue; the weekly manpower report issue; and the placement of windows in doors at the site operations office issue. May 18, 1984, OI Report at 47, 50, 52, 54 (respectively). The staff will evaluate each of these issues in turn.

(1) Manpower Overtime and Contractor Issues

On March 24, 1983, Gischel discussed with J. J. Barton (Deputy Director TMI-2) the need for additional manpower in Plant Engineering (Id. Ex. 2 at 9). Gischel put his request in writing in a memorandum to Barton dated March 29, 1983, in which he proposed:

> 1. Bring in temporary (contractor) personnel of the appropriate caliber to work independently to dispose of the present backlog of important tasks. I have identified this need previously as one Fire Protection, one I & C [Instrumentation and Control]; one HVAC [heating, ventilation, and air conditioning] and three less experienced Mechanical engineers.
>
> 2. Concurrently review Plant Engineering's long term manpower needs as the department work load comes into sharper focus as the new UWI [Unit Work Instruction] program matures.
>
> Id. Ex. 38.

Gischel received a response, dated April 1, 1983, in which Barton said he agreed to the hiring of a fire protection engineer, but would like to discuss alternate solutions to Gischel's other proposals. Barton felt that Gischel was wrong because by eliminating the two employees who performed the majority of overtime showed that the other employees were engaging less than 1 hour per day overtime. Id. Ex. 39. Gischel viewed Barton's response as abusive in nature and felt it questioned his dedication and his staff's dedication to working overtime (Id. Ex. 2 at 10).

Gischel stated that there was some connection between his safety concerns about the polar crane refurbishment program and an alleged reduction in his staff. Barton authorized overtime for Gischel's engineers, which Gischel refused to use. Barton also authorized Gischel additional billets in the Plant Engineering Department in the spring of 1983. Id. Ex. 40 at 66. Barton felt that he had authorized people for Gischel above and beyond his normal allocation. Therefore, Barton saw no deliberate attempt to reduce Gischel's staff. Id.

However, as a result of Gischel's allegation, Barton looked into the Plant Engineering workload more closely. He discovered when checking gate logs, that some of Gischel's engineers were not working a full 8-hour day. Barton confronted Gischel with these findings and told him he had better become a better manager and insist on 8 hours work for 8 hours pay. Id. at 67. It should be noted that R. P. Warren (Systems

Engineering Supervisor for TMI-2 Plant Engineering) recalled that Barton was critical of Plant Engineering work production at TMI-2 even before Gischel arrived at TMI-2 (Id. Ex. 41).

(2) PER-8 Account Issue

On March 25, 1983, Gischel was absent from work for 4 hours to take care of a motor vehicle transaction. He requested to be put in a category of time called PER-8 time, which is a time code for granting paid time off for personal business. Id. Ex. 14 at 10. Gischel received a call from Barton's secretary on March 30, 1983, advising him that Barton would not approve as PER-8 time the 4 hours on his time sheet for the previous Friday (Id.). Barton and Gischel discussed the use of his PER-8 account time during a telephone conversation on March 31, 1983. Barton advised Gischel that it was his policy that the PER-8 account number should not be used except for certain very narrow definitions that Barton would identify. Gischel advised him that he had amassed a huge amount of unpaid overtime during his first year with GPU and he viewed this "bank" of time as being in his PER-8 account (Id. at 11).

On May 3, 1983, Gischel met with J. Troebliger (TMI Area Manager-Human Resources) and L. Whiter (Payroll Administrator at TMI) to discuss the rules for using the PER-8 account number. Gischel came away with the clear interpretation that his view of personal time off for personal business was correct (Id.).

Barton felt that time off to change your automobile registration was not the type of personal time he would authorize GPUN to pay for. Rather, it should be used when an employee has an emergency at home or has a late afternoon doctor's appointment and will not be able to return to work during normal working hours. The employee's supervisor can use the PER-8 account as a way to grant them time off (Id. Ex. 40 at 69). Barton viewed PER-8 as a kind of "perk above and beyond" normal vacation time provided an employee (Id.). Barton felt that the kind of leave Gischel was attempting to use was not the type that he would approve for anybody; therefore, he did not view himself as "picking out Gischel" by not approving Gischel's PER-8 time (Id. at 70).

There is nothing in the record to dispute Barton's statement that he would not approve this type of absence as PER-8 time for any employee. In a May 6, 1983, memorandum documenting the May 3 meeting with Gischel, J. Troebliger said that there is no such thing as storing unpaid overtime in a bank as Gischel seemed to think there was. Additionally the memorandum stated that the granting of PER-8 time is strictly at the discretion of the employee's supervisor. The statements contained in this May 6 memorandum would seem to support Barton's position. Id. Ex. 45.

(3) Weekly Manpower Report Issue

On or about May 2, 1983, Barton asked plant engineering to submit weekly manpower reports to improve the productivity in Plant Engineering. As part of this report, Barton asked Gischel to report on the status of activities going on with respect to recruiting and the filling of vacant positions (Id. Ex. 40 at 72). Barton said the use of these reports was not exclusive to Plant Engineering; he had used them previously in areas that he felt showed lack of adequate performance. In fact, Barton stated that he requested these reports from various departments frequently (Id.).

R. P. Warren (Gischel's assistant) wrote Gischel a memorandum on June 9, 1983, in which he stated that he felt Plant Engineering had been singled out for the additional assignment of providing these weekly manpower reports (Id. Ex. 47). Gischel wrote Barton a memorandum on June 10, 1983, in which he stated that unless he heard otherwise from Barton, Plant Engineering would unilaterally discontinue submission of weekly activity reports effective June 13, 1983 (Id. Ex. 46). Barton chose not to press the issue.

(4) Windows in Doors at Site Operations Office Issue

Gischel felt that placing windows in the doors at the site operations offices was done by Barton as a means to harass Gischel by trying to stir up his employees. Gischel found the episode to be particularly disruptive because of the distraction the windows created in the employees work environment. To the best of his knowledge, Gischel felt his were the only office doors at TMI-2 to be modified by the addition of windows (Id. Ex. 14 at 12, 13). Barton claimed that the windows were put in these doors as a safety precaution. Barton said that an employee was injured when she was attempting to go through a door that had no window in it (Id. Ex. 50, 51). As a result of that accident, Barton called the Safety Director and made him aware of the unsafe situation. It was the Safety Director's decision to put windows in these office doors (Id. Ex. 40 at 75, 76).

10.3 Staff Findings

10.3.1 R.D. Parks Staff Findings

The staff concludes that Parks was, in fact, harassed by management officials of Bechtel with the knowledge of GPUN. The staff finds, consistent with the DOL findings, that

(1) The removal by Thiesing of Parks as alternate startup and test supervisor at TMI-2 on February 23, 1983, was inappropriate.

(2) Although there may have been, initially, a valid reason for Bechtel to investigate allegations that Parks might have been involved with Quiltec, because of his friendship and close working relationship with King, the March 14, 1983, interrogation of Parks by Wheeler, his administrative supervisor, and Hoffman, Bechtel internal affairs, was improper and constituted intimidation of Parks.

(3) The removal by Kanga (Director, TMI-2) of Parks on March 17, 1983, as the primary SO Department representative on the TWG for the reactor building polar crane project was improper.

(4) The action by Wheeler on March 24, 1983, placing Parks on leave of absence with pay and prohibiting his entry to the job site without permission from Bechtel was improper.

DOL was primarily concerned with correcting the harm that had befallen Parks, so their investigation went only as far as they felt was necessary to determine that Park's employer, Bechtel, had improperly discriminated against him for having raised concerns about the safety of the polar crane project. Once they reached that determination, they directed remedial action satisfactory to Parks. There was no DOL judgment issued and Bechtel did not appeal the Compliance Officer's findings or directed remedial action. Parks and Bechtel reached a mutually amicable agreement to return Parks to full-time work with the company on August 4, 1984. As a result, Parks subsequently withdrew his complaint before the Department of Labor.* NRC's review of this matter has led to additional findings which extend beyond those of DOL and bear on the integrity of GPUN management:

(1) The comments by Barton (GPUN), during a GPUN and Bechtel management meeting, threatening to fire or suspend Parks for having publicly aired his allegations were improper.

(2) The comments to Parks by Kanga, threatening him not to publicly state his concerns about the polar crane and telling him that another employee who had tried to publicly state his safety concerns had been humiliated, clearly represented harassment.

(3) Kanga told Parks that he had put Bechtel in a bad light with a client (presumably by raising safety concerns about the crane) and stood a good chance of being fired. This, in the staff's view, was a clear threat of retaliation.

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*Pursuant to 10 CFR 50.54(f), the licensee was formally requested on June 14, 1984, to provide information concerning, among other things, its own investigation of Parks' allegations of harassment. The licensee's response in a letter dated June 26, 1984, advised that Bechtel was performing its own inquiry and that Stier (the licensee's investigator of other aspects of Parks' allegations), therefore, did not investigate this matter. In a letter dated July 5, 1984, from K. P. Richardson (counsel for Bechtel on the Parks matter) to R. C. DeYoung (NRC), several unsupported claims were made by Richardson concerning his determination that Parks' allegations of harassment were without merit. No documentation or evidence, beyond that already available to the staff, was provided by Richardson (i.e., counsel for Parks' letter of August 4, 1983, to the Honorable John Earman, Administrative Law Judge, DOL, with similar letters to Congressman Udall and NRC Chairman Palladino). If such documentation or evidence exists, it has not been provided; therefore, the staff is unable to evaluate these unsupported claims of Bechtel's counsel.

The Commission's regulations (10 CFR 50.7) establish that GPUN has a derivative responsibility for the acts of its contractor (Bechtel) in the harassment and intimidation of Parks as a result of his raising health and safety concerns. The staff also finds that GPUN had a direct responsibility for the acts of harassment on the part of Barton and Kanga (a Bechtel employee and Director of TMI-2 for GPUN as part of the combined management organization). Parks' allegations of harassment were not investigated by the licensee and are not addressed in the Stier Report (November 16, 1983, Vol. III, Harassment Allegations). Harassment of Parks raises questions concerning management's integrity which are addressed in Section 13.0.

10.3.2 L. King Staff Findings

After reviewing the information contained in the OI Report on King's involvement with Quiltec and reviewing the manner in which GPUN dealt with King as a result of his involvement with Quiltec, the staff concludes that there was no harassment, intimidation, or retaliation directed at King as a result of his having raised safety concerns relative to the polar crane refurbishment program.

King's involvement with the polar crane and his related safety concerns did not begin until some time in January 1983. King's involvement was primarily because Parks, one of the SO employees working for King, raised concerns about the polar crane refurbishment program as early as October 1982. Therefore, the staff believes that King's involvement with the safety concerns originated with Parks' request that he attend a meeting with Kanga, which was a direct result of Parks' refusal to approve use of the polar crane.

However, King's involvement with Quiltec began with the incorporation of Quiltec in July 1981--a full year and a half before the polar crane controversy. Quiltec began employing people to work at other nuclear power plants in June of 1982. Herlihy, Rekart, and Lionarons were recruited from September 1982 through the end of January 1983. King's involvement in getting Chwastyk to Beaver Valley as a representative of Quiltec occurred in October of 1982. Most of King's involvement with Quiltec and Quiltec's hiring of GPUN employees occurred well before his suspension and removal from GPUN and considerably before his involvement with the polar crane controversy. The staff additionally concludes, however, that GPU could have resolved certain aspects of the King/Quiltec affair in a more professional manner. For example, Arnold admitted that at the time of King's suspension, GPUN did not have any written policy for handling disciplinary action against exempt employees. Since King's suspension, however, GPUN has formalized a policy where supervisors or managers are to discuss matters of suspension with senior management before taking any action. Arnold feels that this is essentially the manner in which the King case was handled (OI Report May 18, 1984, Ex. 16 at 106-108). Initially, King was suspended on the spot and walked off the TMI site as a direct result of answering only two questions posed to him by Barton--the staff believes this was a severe action. Although King was placed in a suspended-with-pay status the day after the initial suspension by Barton, the staff believes that should have occurred on February 24. Such a suspension with pay would have more equitably allowed King to begin preparing his response to GPUN's charges about his alleged involvement with Quiltec.

The staff concludes that GPUN was very concerned about the safety issues raised by King as indicated by Clark meeting with King to discuss concerns about the polar crane the day after King's suspension. Clark avoided any discussions with King about the Quiltec controversy. Arnold took it upon himself to be responsible for resolving the King/Quiltec matter because he felt the need to be deliberative and methodical because King had been involved in raising safety issues. Arnold knew that there had been disagreements between King and others in the weeks before King's suspension.

Additionally, Arnold expressed concern because Thiesing brought forth the information on King's involvement with Quiltec; Arnold knew of the personality conflict between King and Thiesing. The staff notes that although Bruner, Thiesing's supervisor at Bechtel, did not feel that Thiesing had violated any Bechtel policy or procedure in the way he conducted his private procurement investigation of King, Arnold disagreed.

In his testimony, Thiesing made much of the fact that he did not want to make anyone in upper management aware of the rumors he had heard about King's involvement with an outside consulting firm because he did not feel the rumors were true. Although Thiesing and King were on the same administrative level in the integrated Bechtel/GPUN organization, the staff feels Thiesing's action in conducting a private procurement investigation was an attempt by Thiesing to harass King.

There is no question that the timing of King's suspension and ultimate removal was poor. This was acknowledged even by Kuhns (Id. 31 at 44). However, Arnold and other company officials testified that they saw no connection between King's raising of safety concerns and his suspension and ultimate removal from GPUN for his Quiltec activities.

In its investigation of King's allegations, DOL concluded that GPUN had a long standing policy of strictly limiting recruiting of employees from other companies with which they did business and, equally as strenuously, protecting their own employees from outside recruitment. DOL presented several examples of letters sent by GPUN to other companies in the nuclear field protesting their attempts to recruit GPUN employees (Id. Ex. 85 Attachment D-7). Therefore, DOL made the point, and the staff agrees, that the serious manner in which GPUN dealt with King for his recruiting of GPUN employees was totally consistent with existing GPUN practice.

It was equally clear to the staff from reviewing the OI information that no one in a senior management position at TMI-2 had any knowledge of King's involvement with Quiltec until immediately before his February 24, 1983, suspension from GPUN. Once senior management officials became aware of King's involvement, they acted quickly and in a manner they perceived to be fair and equitable.

The staff concludes that King was properly suspended and removed from his duties at GPUN as a result of his involvement with Quiltec. The staff concludes that King was not improperly harassed, intimidated, or retaliated against for any of his involvement with the polar crane safety-related issues.

10.3.3 E. Gischel Staff Findings

The staff finds that Gischel's complaints on the manpower, overtime, and contractor issues; the PER-8 account issue; the weekly manpower report issue; and the placement of windows in doors at the site operations office issue are without merit. It appears that Barton had a longstanding problem with the work production levels in the Plant Engineering Department that predated Gischel's arrival on the scene. In relation to the PER-8 account, it would appear that Barton's interpretation of the proper usage of this time category is more accurate than Gischel's. Regarding the weekly manpower reports, Gischel unilaterally decided to stop sending them. Barton did not agree with Gischel's decision to stop sending the reports because Barton felt they still had a use (Id. at 73). However, Barton knew that Gischel was in a sensitive situation and, even though he felt these reports served a proper purpose, he relented and did not pursue the matter with Gischel (Id. at 74). The modifications to the office doors, as outlined above, was clearly a matter of employee health and safety. The staff concludes that these four issues do not indicate harassment, intimidation, or retaliation toward Gischel on the part of management.

The issue concerning a neuropsychological examination for Gischel presented more difficult questions in determining whether or not any individual management official employed by GPUN had acted to intimidate or harass Gischel for raising concerns about the safety of the polar crane operation.

At the time Gischel returned to work in October of 1982 after having suffered a stroke in June of 1982, GPUN had no guidelines for determining when an employee who had suffered an injury or a serious medical disability off site was fit to return for duty. Gischel was allowed to return to work without having a medical examination to determine his ability to perform the full range of his duties as Plant Engineering Director at TMI-2. Gischel was allowed to begin working part time and to begin assuming his duties as he felt comfortable with them.

On November 18, 1982, Gischel had his periodic medical examination performed by Dr. I. Imber of Reading, Pennsylvania, and was found fit for work. On December 6, 1982, when Gischel visited the emergency room because of dizziness, he met Dr. R. Jones, who continued to treat him during the period of the polar crane controversy. Dr. Jones confirmed that Gischel had lost the right field of vision in each eye as a result of the stroke and also diagnosed Gischel as suffering from hypertension. During the time of Gischel's recovery, particularly the spring of 1983, he was intimately involved in raising safety concerns relative to the refurbishment of the polar crane. During that same period of time, the question of the neuropsychological examination for Gischel continued to grow in importance with various management officials.

As stated in Section 10.2.3 of this report, Gischel began consulting with Dr. W. Jenkins at Stress Control, Inc. It was Dr. Jenkins' opinion that to fully evaluate Gischel's condition would require Gischel to take the neuropsychological examination. Gischel was reluctant to do this and, as a result, he never did take the examination.

On the basis of the evidence developed, the staff concludes that the licensee's reason for attempting to get Gischel to take the neuropsychological examination was the concern on the part of many officials with GPUN that Gischel was in fact having serious physical problems, which potentially presented a danger to both himself and other GPUN employees at the TMI site. For example, Dr. Jenkins reported that Gischel had "receptive language function problems" (i.e., when something was said to him he may not be able to understand it completely) (May 18, 1984, OI Report Ex. 3 at 46, 47). Dr. Glazer felt that Gischel was certainly not safe to himself, or to other people around him, in unescorted areas of the plant (Id. Ex. 11 at 25, 26).

The OI Report focused on the fact that Dr. Glazer was concerned about Gischel's unescorted access status. However, Gischel had not been inside the plant-security boundary since June of 1982 when he had the stroke. In essence, he had voluntarily let his access authorization expire and made no attempt to renew it. Id. Ex. 16 at 26, 27. Arnold felt from his personal observations that Gischel had a hard time reading and, on the basis of his conversations with Gischel, had a hard time understanding. Arnold was not alone among management employees of GPUN in his concerns about Gischel's physical condition. Gifford testified that one day he was standing on the side of the road at the site, Gischel almost ran over him with his car. As a result of this near accident, Gifford said he sensed that Gischel never saw him and he perceived this to be a visual problem of Gischel's.

Evidence shows that GPUN was aware of the conflicting opinions of Dr. Jones and the doctors of Stress Control concerning Gischel's fitness to resume his duties. However, Dr. Jones' diagnosis of loss of vision and hypertension appears consistent with the concerns of Dr. Jenkins and Dr. Glazer. No evidence was developed to indicate whether or not Dr. Jones had knowledge of the work environment or job-related stress involved with Gischel's position. The doctors of Stress Control, however, because of their involvement with GPUN as an advisor to the company, were clearly knowledgeable of the work environment and job-related stress. The staff concludes that it is reasonable, under these circumstances, for the licensee to rely on the medical advice of the Stress Control doctors.

Gischel felt that Arnold had threatened him on April 22, 1983, regarding his attendance at the Udall Hearings. However, the staff finds that it was Gischel who raised the issue about his testimony to Congress. During his meeting with Gifford, Gischel stated that he had not been invited to testify at the hearings scheduled for April 26. Gifford clearly explained to Gischel that he did not see any connection between the neuropsychological examination and Gischel's testimony before the Udall Committee.

As discussed in Section 10.2.3, throughout the entire case involving the neuropsychological examination, it was Gischel who continued to change the ground rules and the format for his taking the neuropsychological examination. Gischel would set certain conditions and then he would not meet them, or he would accuse GPUN of not meeting them. Gischel scheduled the examination several times for himself and then cancelled or did not show up. Even Dr. Jones, early in February, suggested very strongly to Gischel that he should simply take the examination and get it over with (Id. Ex. 6 at 2).

As of July 1, 1983, Gischel still had not taken the examination and had not lost any salary. Ultimately, Gischel's apparent fear of the examination was so great that he requested a transfer to Reading, Pennsylvania. GPUN granted his request and he was transferred to Reading effective July 1, 1983.

The staff concludes that there was no intimidation, harassment, or retaliation against Gischel for his refusal to take the neuropsychological examination and that the taking of the examination, itself, was not harassment. The staff believes that GPU felt that Gischel had a serious medical problem that had to be dealt with before they could decide if Gischel was able to resume the full range of his duties as Plant Engineering Director at TMI.

10.3.4 Overview

As discussed in Section 10.3.1, the harassment of Parks raises questions concerning management integrity. These matters are addressed in Section 13.0.

The staff also finds that there was a lack of knowledge of GPUN company policy protecting GPUN employees, as well as contractor or subcontractor employees, from harassment and intimidation for engaging in activities protected by law and the Commission's regulations (i.e., Energy Reorganization Act, Section 210 and 10 CFR 50.7). On the basis of their individual involvement, it appears that corporate management was sensitive to and knowledgeable of their responsibilities to protect employees from harassment and intimidation; however, this does not appear to be the case for senior managers or employees of GPUN, nor for some corporate managers, senior managers, and employees of GPUN's contractor (Bechtel). GPUN's policies in this area are evaluated as part of the staff's overall position on management integrity in Section 13.0.

11.0 CHANGE OF OPERATOR TESTIMONY

11.1 Background

During the NRC staff's review of the GPU v. B&W lawsuit record, it was determined that the trial testimony of W. H. Zewe (former TMI-2 Shift Supervisor) and E. R. Frederick (former TMI-2 CRO) differed significantly from previous statements made by Zewe, Frederick, and C. C. Faust (former TMI-2 CRO) concerning the issue of whether or not full-flow high pressure injection (HPI) had been manually initiated on the morning of the accident when the last two reactor coolant pumps were shut down (at 0541 on March 28, 1979).

During the first days and months following the accident, Zewe, Faust, and Frederick were repeatedly interviewed by the NRC and GPU investigators in order to develop an understanding of the accident and a documented sequence of events (SOE). Appearing before the Plant Operating Review Committee (PORC) in mid-May 1979, the operators insisted that full-flow HPI was manually initiated when the reactor coolant pumps were secured at 0541. At the trial, Zewe testified that the PORC modified the SOE to include this event based on the agreement of all three operators (Zewe, Frederick, and Faust) (Zewe at Trial Tr. 2759-2763). In a taped interview with GPU investigators on May 25, 1979, Zewe discussed the countdown that was performed as Frederick secured the reactor coolant pumps and Faust initiated HPI (B&W 5000CC). In addition, during separate interviews before NRC investigators, Faust and Zewe stated that HPI was manually actuated when the reactor coolant pumps were secured (B&W 5006AA and B&W 271 at 30, respectively). At a meeting with the Advisory Committee on Reactor Safeguards (ACRS) on July 15, 1979, Zewe stated that HPI was manually initiated when the last two reactor coolant pumps were secured (Zewe at Trial Test. 2756).

GPU's Annotated Sequence of Events dated February 6, 1981 (GPU 2079), contains the following entry at time 0541:37: "The operator manually initiated the Safety Injection portion of Engineered Safety Feature trains A and B to supply additional cooling water to the reactor core." The references provided for this entry were given as (1) T. L. Van Witbeck memorandum regarding TMI-2 operating staff and the PORC SOE review meeting, (2) TMI staff interview conducted by Met-Ed/GPU with E. Frederick, dated March 20 and April 6, 1979, and (3) TMI staff interview conducted by NRC with Frederick, dated April 23, 1979. GPU 2079 at 8, 41, 42. None of the other accident investigation chronologies list HPI actuation on or about 0541 (see IE Bulletin 79-05A; IE Investigative Report, NUREG-0600; the Electric Power Research Institute's "Analysis of TMI Unit 2 Accident;" the Rogovin Report, "TMI Report to the Commissioners and to the Public;" B&W's "Annotated Sequence of Events;" and B&W's "Final Report of the TMI-2 Occurrence").

In his opening statement at the trial on November 1, 1982, R. B. Fisk, the attorney for B&W, emphasized the GPU SOE conclusion that HPI had been initiated at 0541. Had it remained on, he argued, core damage would not have occurred. Thus, Fisk concluded that Met-Ed was negligent by turning off the HPI pumps. Fisk further argued that the "mystery man," who turned the pumps off, could not have been a B&W employee; thus, B&W was not responsible for the core damage. Fisk at Trial Test. 159.

During the trial, the testimony of Zewe and Frederick changed from their previous accounts of HPI actuation. Zewe testified that he remembered only one manual full-flow actuation of HPI, which occurred at about 0720 (Zewe at Trial Test. 2170). Frederick testified that HPI could not have been actuated at full flow at 0541 (Frederick at Trial Test. 3499). Frederick's testimony was based on his understanding of the effect on makeup tank (MUT) level when HPI is initiated. Frederick's expert testimony on this subject was subsequently eroded under cross-examination by B&W attorneys. Thus, because of the importance of this issue to the trial, EDS Nuclear, Inc., was contracted to perform an analysis designed to determine whether HPI actuation occurred at TMI-2 at or about 0541 (OI Testimony Change Ex. 36 at 18). The results of the EDS analysis were presented at the trial by J. H. Holderness. The EDS analysis concluded that full HPI injection at or about 0541 did not occur (Holderness at Trial Test. 5636).*

Following the lawsuit settlement, GPU contracted B&W to perform an independent analysis of this issue. The B&W report entitled "Response to GPUN Questions Concerning HPI Actuation at TMI-2 About 5:41 a.m. on March 28, 1979," was forwarded to H. R. Denton (NRR) by E. Blake (Counsel for GPUN) by letter dated September 15, 1983. The B&W analysis concluded that the reactor coolant system (RCS) experienced a significant cooldown during the period 0534 to 0605. The evaluation concluded that, during the period 0534 to 0540, the cooldown was most likely caused by a combination of emergency feedwater (EFW) flow and partial HPI flow and that between 0540 to 0605 the cooldown was caused primarily as a result of EFW flow. The report also concluded that full HPI actuation did not occur at the time the last two reactor coolant pumps were tripped (0541). B&W Analysis at 54.

With the assistance of EG&G Idaho, the staff independently evaluated the possibility of HPI actuation at 0541 and performed a review of the EDS and B&W analyses. On the basis of these analyses, it is the staff's conclusion that actuation of HPI immediately after the last reactor coolant pumps were tripped at 0541 is extremely unlikely. The analyses showed that RCS cooldown occurred between 0534 and 0605 and that partial actuation of HPI for a short period (about 6 minutes), beginning about 0534, was possible. However, it is not possible to conclusively affirm or reject limited HPI actuation immediately before 0541. See memorandum from H. R. Denton (NRR) to B. B. Hayes (OI) dated April 24, 1984. The results of the staff's evaluation are consistent with the sequence of events described in NUREG-0600.

In a letter dated August 23, 1983, from E. Blake (Counsel for GPUN) to H. R. Denton (NRR) the licensee forwarded a brief prepared by the law firm of

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*NRR staff note: Because of the time constraints placed upon EDS to perform the analysis, EDS examined only makeup tank level behavior around 0541 to determine if the response exhibited characteristics of HPI actuation. The EDS report did not address actuation at any other time, and it did not examine other data which might be affected by HPI actuation.

Kaye, Scholer, Fierman, Hayes, and Handler (Kaye-Scholer). The brief entitled, "Memorandum on the 5:41 HPI Actuation 'Mystery Man' Issue," provided Kaye-Scholer's analysis of the key documents associated with the HPI actuation issue and the rationale for why the trial testimony of Zewe and Frederick differed from accounts they had provided during earlier testimony, depositions, and interviews. Following the September 1983 publication of NUREG-1020, the licensee provided its response to the public version of the document in a letter dated October 14, 1983, from H. Dieckamp (GPU) to the NRC Commissioners. With respect to the staff concerns regarding the 0541 HPI actuation issue, the licensee's position may be summarized as follows:

(1) "The official GPU chronology of the accident sequence was compiled with the assistance of a reputable technical consulting firm, and was based on extensive analysis of the accident data as well as the statements made by Met-Ed personnel to NRC and GPU investigators. The specific inclusion of an HPI actuation at 0541 was predicated solely on the statements made by two of the control room operators present at the time and was so identified in the chronology." Dieckamp letter at 21.

(2) "The evidence adduced at trial was not a change in position by GPU management but a reflection of further technical study in order to refute the now disproven, spurious trial argument raised by B&W's counsel." Id. at 23.

(3) The licensee used these statements and its counsel's brief, in part, to argue that "when measured against the development of objective facts from detailed technical analyses and from the accident data, the fact that two of the operators' earlier recollections of manual actuation was incorrect is fully understandable." Id. 25.

While the staff considered the statements made by the licensee in its August 23 and October 14, 1983, submittals, neither fully answered the staff's management integrity concerns expressed in the limited distribution version of NUREG-1020. These issues were specifically identified as follows in Section 10.7 of NUREG-1020LD:

(1) whether the control room operators who had made previous statements concerning the 0541 HPI actuation had misrepresented the facts either when they originally said that such an action occurred or when they later said that such an actuation had not occurred

(2) if the latter, whether any improper influence was brought to bear on the control room operators in connection with their testimony at trial

(3) whether licensee's reversal of position concerning an actuation of HPI at 0541 was improperly motivated by financial considerations arising from the GPU v. B&W lawsuit

(4) whether the licensee had an obligation to report and failed to report to the NRC the modification in its chronology of the accident sequence

The staff recognized that possible explanations for GPU's reversal of position on the question of a 0541 manual HPI initiation could include the difficulty of recall in a stressful situation with a reasonable, honest effort at presenting the facts as well as wrongful conduct. Nevertheless, the staff believed that an attempt to find answers to the questions identified above should be undertaken. Thus, in a memorandum, dated November 7, 1983, from H. R. Denton (NRR) to B. B. Hayes (OI), the staff requested that OI investigate the matters discussed in questions 1 through 3 above. November 7, 1983, memorandum at 28-29. A more comprehensive background on this issue is discussed in Sections 3.1 and 10.7 of NUREG-1020LD.

11.2 Investigation Results

The OI investigation developed testimony corroborating the fact that the control room personnel at the time of the accident* (Zewe, Faust and Frederick) insisted on including a manual HPI actuation at 0541 in the GPU sequence of events. According to T. L. Van Witbeck, one of the principal authors of GPU's "Annotated Sequence of Events" (GPU Ex. 2079), the operators "were adament with regard to the initiation of safety injection on or about this particular time . . . . The operators insisted that they had done this at that time. We had no information which supported that and I frankly was in charge of the accident assessment side and I said all right, we cannot prove it and we cannot disprove it, we will put it in; and we put it in. I felt they were incorrect at the time." OI Testimony Change Ex. 22 at 18.

According to R. C. Arnold, "the technical people that were looking at the objective data were generally of the opinion that the actuation had not occurred, that the operators were in error in their recollections." However, Arnold further explained that this one issue should not be taken out of context, there were a number of issues where the recollection of operators were different from the technical people that were performing the analyses from objective data. OI Testimony Change Ex. 26 at 15.

The law firm of Kaye-Scholer was retained by GPU to represent GPU in its suit against B&W. J. Liberman of the law firm Bishop, Liberman and Cook, (General Counsel for the licensee) acted as the point of contact between GPU and Kaye-Scholer for all trial matters (OI Testimony Change Ex. 36 at 5, 6). D. Klingsberg, a partner in the law firm of Kaye-Scholer, was in charge of the lawsuit (Id. at 4). Klingsberg stated that he made the decisions on strategy and tactics without consultation with either GPU or Liberman (Id. at 6).

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*F. Schiemann was the TMI-2 Shift Foreman at the time of the accident. However, he was not involved in the review of the SOE or other matters involving the 0541 HPI actuation, thus, no interview of Schiemann was conducted by OI.

According to testimony presented by W. G. Kuhns and H. M. Dieckamp, they had little involvement in the actual conduct of the trial. Kuhns, although initially involved in selecting Kaye-Scholer to try the case, had no involvement in the actual trial up to the point of possible settlement and was not aware at that time of any change in testimony by the operators (OI Testimony Change Ex. 41 at 5, 6, 8). Dieckamp stated that his main source of information during the trial was the New York Times. He received copies of the transcripts, but did not read them (OI Testimony Change Ex. 27 at 10). Arnold stated that he was not directly involved in any of the trial strategy although he did provide comments on the draft complaint against B&W and did serve as a principal witness during the trial. He was not involved in the selection of Frederick as an expert witness and he was not involved in the preparation of either Frederick or Zewe for their testimony. OI Testimony Change Ex. 26 at 19, 32, 46.

P. R. Clark testified that he had no involvement in the litigation effort against B&W (OI Testimony Change Ex. 28 at 5). H. D. Hukill stated that he had no responsibilities in connection with the lawsuit and did not have any discussions with any of the control room personnel regarding their testimony (OI Testimony Change Ex. 43 at 1).

R. C. Seltzer, also a partner with Kaye-Scholer, and A. MacDonald, an Associate with Kaye-Scholer, worked with Klingsberg on the litigation. Seltzer represented Frederick and assisted, in varying degrees, in the deposition preparation of each of the other operators (Id.). Klingsberg represented Zewe at his deposition; MacDonald represented Faust and F. Schiemann during their depositions and assisted Klingsberg during Zewe's deposition (OI Testimony Change Ex. 36 at 9 and Ex. 39 at 7).

D. E. Taylor, President of Taylor Associates, Inc., a firm specializing in technical litigation support, was retained by Kaye-Scholer. On at least two occasions, Taylor and MacDonald met with Zewe, Faust, Schiemann, and Frederick in an attempt to assemble the best collective recollection the operators had of the events (OI Testimony Change Ex. 38 at 16).

According to Klingsberg, Seltzer, and Taylor, the issue of HPI actuation at 0541 did not become a factor in the trial until Fisk raised the issue in his opening remarks at the trial (OI Testimony Change Ex. 36 at 7, Ex. 37 at 7 and Ex. 39 at 17). Kaye-Scholer's attorneys had no discussions with GPU before the trial regarding a position on the 0541 actuation (OI Testimony Change Ex. 37 at 20, 21). After Fisk raised the issue of the "mystery man," Klingsberg contacted Liberman and Arnold to obtain engineering assistance from GPU (OI Testimony Change Ex. 36 at 18, 19). Engineering assistance was requested in order to perform an analysis to determine whether or not there had been an actuation of HPI at 0541 based on recorded plant data rather than operators' recollections (OI Testimony Change Ex. 37 at 22). According to Klingsberg, this work was initiated by T. G. Broughton with the assistance of some other individuals in Parsippany, New Jersey (OI Testimony Change Ex. 36 at 18, 19). Seltzer stated that Broughton's study concluded that full manual actuation of HPI at 0541 was not possible (OI Testimony Change Ex. 37 at 23).

During Zewe's interview with OI on May 10, 1984, Zewe stated that after Fisk raised the "mystery man" argument, the preparation for his trial testimony became quite extensive. Zewe recalled MacDonald and Taylor presenting him with charts involving MUT levels and other data and being asked to evaluate whether or not HPI had actuated at 0541. Zewe stated that as a result of his trial preparation, he was "totally convinced" that HPI had not been actuated at 0541. OI Testimony Change Ex. 21 at 45, 55. Zewe stated that he had not been interviewed by anyone in GPU management with regard to his deposition or trial testimony (Id. at 52, 53).

Frederick was selected by Kaye-Scholer's attorneys to testify as to why there had not been an HPI actuation at 0541 to the best of his recollection and to provide expert testimony as to why the performance of the MUT level at 0541 was inconsistent with HPI actuation (OI Testimony Change Ex. 37 at 24). Frederick was selected to provide the expert testimony because he was particularly articulate and was familiar with teaching nuclear power plant functions (Id. at 29). During his trial preparation, Seltzer recalled that Frederick worked with GPU technical personnel (Broughton's analysis group) in preparing for his expert testimony. However, Seltzer stated that he believes Frederick was already convinced that the 0541 HPI actuation did not occur and that his work with the GPU technical personnel reinforced that belief. Id. at 23-25.

During his trial testimony, Frederick stated that he recalled only one full manual HPI actuation on the morning of the accident and that occurred about the time the site emergency was declared (0650). Frederick also testified that on the bases of his review of the charts depicting what was happening with MUT level on the morning of the accident and his knowledge of how the MUT level reacted when HPI was actuated, HPI was not actuated at 0541 on the morning of the accident. In making this assertion, Frederick relied on data that showed a decreasing MUT level at 0541, which would be impossible if HPI were actuated according to Frederick. Frederick said that if HPI had been actuated, a check valve in the MUT suction line would have shut and precluded any further level drop in the MUT. He stated that he had seen the MUT level stop decreasing on initiation of HPI on many occasions. OI Testimony Change at 19.

During cross-examination by Fisk, Frederick was questioned concerning an analysis performed by B&W, which showed that MUT level was also decreasing between 0718 and 0725. This period included the manual actuation of HPI at 0720 that was confirmed by the control room computer. Frederick refused to accept the B&W analysis as being correct because he believed it was impossible to have a declining MUT level and HPI actuation. B&W agreed to provide the reactimeter data on which its analysis was based to allow GPU to perform its own analysis of the data. As a result, Frederick did not testify further on this issue. OI Testimony Change at 20. According to Frederick, he had no contact or interviews with GPU management during the time between his deposition and the trial (OI Testimony Change Ex. 20 at 80). The OI investigation identifies contradictory testimony and statements by Frederick concerning his involvement in the inclusion of HPI actuation at 0541 in the licensee's SOE. The staff's position on this matter is discussed in Section 11.3. See OI Testimony Change at 4.

When Fisk cross-examined Frederick on the MUT level at 0720, which contradicted Frederick's explanation of how the system reacted during HPI actuation, Kaye-Scholer decided that it would no longer be sufficient to rely on GPU's internal expertise; thus, EDS Nuclear, Inc., was contracted to perform a study of the 0541 HPI actuation. Seltzer could not recall the details of the arrangement but believed that Kaye-Scholer must have gotten clearance from GPU management to contract for the study because of the cost. OI Testimony Change at 24. Klingsberg stated that he made the decision to bring in EDS to perform the independent analysis (OI Testimony Change Ex. 36 at 17, 18). J. H. Holderness, an employee of EDS, presented the results of the EDS analysis at the trial on January 3, 1983. No further testimony by the operators concerning HPI actuation at 0541 occurred.

The lawsuit was settled out of court on January 24, 1983, 12 weeks after the trial began. As a result, the issue of HPI actuation at 0541 was not resolved before the trial was terminated.

As discussed in Section 11.1, following the trial, Klingsberg authored a document entitled, "Memorandum on the 5:41 HPI Actuation 'Mystery Man' Issue," dated August 16, 1983. According to Klingsberg, he prepared the document at the request of Liberman. The purpose of the memorandum was to summarize the testimony regarding the HPI actuation/"mystery man" issue. This was one of several memoranda that were prepared to respond to inquiries from various parties and individuals regarding issues in the trial. OI Testimony Change Ex. 36 at 67, 68. This document was submitted to the NRC by the law firm of Shaw-Pittman on August 23, 1983. A corrected copy of the document was sent by Shaw-Pittman on August 25, 1983. As submitted, there was no indication in the original cover letter regarding whether or not the document was being sent to the NRC on behalf of GPUN. During Arnold's interview with OI on May 31, 1984, he was questioned regarding this document. Arnold recalled receiving a copy of the document but did not recall having any input in preparing the document. He believed that it was GPU management (Kuhns and/or Dieckamp) that decided and perhaps even initiated the idea of having Kaye-Scholer set forth the background on the HPI actuation and what was done to support the testimony that was presented on behalf of the company at the GPU v. B&W trial. OI Testimony Change Ex. 26 at 36, 43, 45. Arnold said the document was not sent to the NRC to notify it of an official change in position by the company. Instead, Arnold believes that there were a number of inquiries outside of the NRC regarding the "mystery man" issue and that it would be desirable for the attorneys who had represented the company in the lawsuit to tell the NRC "here is what took place, as we understood it." Id. at 43.

11.3 Staff Findings

On the bases of the EDS and B&W analyses and its own analysis, the staff finds that full manual HPI actuation at 0541 is extremely unlikely. The difference between the licensee's SOE and the staff's chronology of the accident, with respect to the HPI at 0541, was known to the staff at the time the SOE was submitted, as was the basis for its inclusion (i.e., operators' recollections of events). The fact that the licensee at some later time refutes the operators' recollections, does not impose a reporting requirement on the licensee because the NRC was already aware of the difference and concluded that it was not material.

The staff finds that the operators' earlier statements above led to the inclusion of HPI actuation at 0541 in the licensee's Sequence of Events. However, on the basis of the OI investigation, the staff does not find any evidence of intentional misrepresentation of the facts by these operators concerning HPI actuation at 0541.

The staff finds that Frederick and Zewe did change their trial testimony concerning HPI actuation at 0541. Faust did not testify at trial and maintained, during his OI interview, his recollection that HPI actuation at 0541 had occurred. However, on the basis of a subsequent analysis, Faust stated that his recollection may be wrong.

No evidence was developed by OI that would indicate any improper activity or coercion by GPUN or Kaye-Scholer with respect to operators' change in testimony concerning HPI actuation at 0541. In fact, little or no contact occurred between the operators and GPU or GPUN management concerning issues involved in the trial. Preparation of witnesses was the responsibility of Kaye-Scholer. Presentation of technical data to a prospective witness, which differs from his earlier statements or recollections, is not improper and is not a form of coercion.

The OI investigation identified conflicting testimony and statements by Frederick concerning his involvement in the inclusion of HPI actuation at 0541 in the licensee's SOE. Whether Frederick was silent and never challenged the inclusion of HPI actuation at 0541, as he testified during the OI investigation and trial, or whether he insisted on including HPI actuation at 0541, as circumstantial evidence and testimony of others indicates, cannot be resolved on the basis of the evidence developed by OI, to date. Currently, Frederick is assigned full time to training in preparation for taking an NRC Senior Reactor Operator (SRO) re-examination for Instructor Certification on TMI-1 on August 6, 1984 (he failed an NRC examination in March 1984). He is currently a licensed SRO on TMI-2 and is the Supervisor of Licensed Operator Training for TMI-1 and TMI-2. By letter dated May 30, 1984, from H. R. Denton, Frederick was informed of ongoing NRC investigation concerning his involvement in TMI-2 leak rate testing and was requested to submit specific information pursuant to 10 CFR 55.10(b). The staff will resolve its leak rate testing and HPI testimony concerns regarding Frederick before making a decision to approve him as an instructor for TMI-1. Because of these concerns, the staff will withhold its TMI-1 Instructor Certification such that the licensee can assign Frederick no duties associated with TMI-1 licensed operator training until these issues are resolved. This decision will be made in concert with the staff's determination of whether to suspend, modify, or revoke Frederick's current TMI-2 SRO license. These issues are being handled separately from TMI-1 restart.

12.0 LEGAL STANDARDS

The purpose of this section is to discuss the standards for judging licensee's management integrity. These standards will be applied in evaluating the relevant information and arriving at a staff position in Section 13 of this report.

The question of what legal standards are applicable in an evaluation of management integrity was addressed recently in the TMI-1 Restart proceeding by the ASLAB. See Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1), ALAB-772, 19 NRC ___, slip op. at 10-14 (May 24, 1984); see also Houston Lighting and Power Co. (South Texas Project Units 1 and 2), LBP-84-13, 19 NRC ___, slip op. at 7-25 (March 14, 1984). The ASLAB observed that the Commission had directed the ASLB in the TMI-1 restart proceeding to "apply its own judgment in developing the record and forming its conclusions" on the management issues identified by the Commission despite the acknowledged lack of standards for nuclear power plant management and operation. ALAB-772, supra, slip op. at 11. The ASLAB also noted, however, that several Commission precedents "provide valuable aid for grasping the slippery concept of management competence." Id., slip op. at 14.

The ASLAB equated the term "character" in Section 182a of the Atomic Energy Act, 42 U.S.C. 2232(a), with "management integrity" as that concept has been applied in the restart proceeding. "Evaluation of character," stated the ASLAB, "always involves consideration of largely subjective factors." Id., slip op. at 12. Several NRC cases that provided "guideposts" in evaluating "character" or "management integrity" were cited by the ASLAB. Id., slip op. at 13.[1]

On the basis of the staff's review of the applicable caselaw, the staff concludes that the finding that must be made under the AEA relative to a licensee's or applicant's character is to determine whether, based on the totality of relevant circumstances, the licensee or applicant has demonstrated "a willingness and propensity, or lack thereof, to observe the

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[1] No specific NRC regulation addresses the "character" qualification of section 182a of the Atomic Energy Act. The NRC is different in this respect from the Federal Communications Commission, which implements the character requirement in its authorizing statute (47 U.S.C. 224(b)) through a specific regulation requiring that an applicant make a "satisfactory showing" that it is "of good character." See 47 CFR 73.24.

Commission's health and safety standards."[2] While the term "character" may include a wide variety of distinctive qualities and traits, the character attributes with which the NRC is concerned are those which have a rational connection to its regulatory responsibilities.

NRC cases addressing management character are not common; one must go back to the early 1960's to find any NRC case in which a license was revoked or a renewal request denied for reasons that appear related to character.[3] Some useful precedents, however, are provided by caselaw from other regulatory agencies.

As shown by the cases cited by the ASLAB and by other NRC caselaw, many individual factors have been examined in relation to character. These include, for example, candor and truthfulness,[4] attitude toward responsibilities, and compliance with legal requirements. See, e.g., Consumer Power Co. (Midland Plant, Units 1 and 2), CLI-83-2, 17 NRC 69, 70 (1983) ("Not only are material false statements and omissions punishable under Sections 234 and 186 of the Atomic Energy Act, but deliberate planning for such statements or concerns on the part of applicants or licensees would be evidence of bad character that could warrant adverse licensing action even where those plans are not carried to fruition."); Houston Lighting and Power Co. (South Texas Project, Units 1 and 2), CLI-80-32, 12 NRC 281 (1980) (Commission cited the history of the South Texas project--"at least 12 separate NRC investigations over a 2 1/2 year period, resulting in conferences with the licensee, several prior items of noncompliance, a deviation, five immediate action letters, and [now] substantial allegations of harassment, intimidation and threats directed to QA/QC personnel and apparent false statements in the FSAR"--as relevant to the basic competence and character of the applicant); Coastwise Marine Disposal Co., 1 AEC 581 (1960), affirmed, 1 AEC 619 (1961) (Commission revoked license based on repeated violations of license terms and willful false statements demonstrating "unfitness" to continue as a licensee); X-Ray Engineering Co., 1 AEC 466 (1960) (Commission revoked license based on repeated and willful violations of license, numerous uncorrected noncompliances and willful false statements); Hamlin Laboratories, 2 AEC 423 (1960) (Commission denied renewal application citing pattern of untruthful reports and continued willful violations of license requirements); Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-691, 16 NRC 897 (1982) (statement by Appeal Board that intentional withholding of relevant and material information might call into question an applicant's character); Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), CLI-82-1, 15 NRC 225, 227 (1982) (Commission directed issuance of notice of violation for material false statements and noted apparent lack of attention by applicant to its responsibilities concerning communication of information); South Texas, LBP-84-13, supra (ASLB scrutinizes, among other things, applicant's record of compliance, its response to noncompliances and, "most importantly," its candor and truthfulness); Niagara Mowhawk Power Corp. (Nine Mile Point Nuclear Station), 45 FR 80334-80336 (December 4, 1980) and 46 FR 20341-20342 (April 3, 1981) (NRC staff issued and later withdrew show cause order where submittal of false statements was not made with intent to deceive and appropriate corrective action was taken); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-738, 18 NRC 177 (1983) (ASLAB granted motion to reopen on issues related to management integrity based on alleged violations of technical specifications, noncompliance with proper operating procedures and destruction and falsification of records); Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), 14 NRC 381 (1981) and 16 NRC 281 (1982), remanded in part, ALAB-772, 19 NRC ___ (May 24, 1984) (ASLB addressed management attitude toward certain incidents of cheating on operator qualification examinations as a factor relevant to management integrity).

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[2] See South Texas, LBP-84-13, supra, slip op. at 15-16; Konigsberg v. State Bar, 353 U.S. 252, 262-263 (1956); Schware v. Board of Bar Examiners of New Mexico, 353 U.S. 232, 239 (1956) (a state may require character traits of an attorney which have a rational connection to an applicant's fitness to practice law.)

[3] See Hamlin Testing Laboratories, Inc., 2 AEC 423 (1964), affirmed sub nom., Hamlin Testing Laboratories; Inc. v. AEC, 357 F.2d 632 (6th Cir. 1966); Coastwise Marine Disposal Co., 1 AEC 581 (1960), affirmed, 1 AEC 619 (1961); X-Ray Engineering Co., 1 AEC 466 (1960).

[4] As the ASLB noted in South Texas, LBP-84-13, supra, "it is clear that truthfulness contemplates not only false or misleading statements but the completeness or comprehensiveness of information provided by an applicant to the Commission." Slip op. at 16-17 (citations omitted). The ASLB also emphasized the Commission's citation in CLI-80-32 of "cases suggesting that willful misrepresentations to the Commission, or representations made with disregard for their truth, could be grounds, without more, for license denial." Id., slip op. at 23 (footnote omitted).

The evaluation of an applicant's or licensee's character is based on consideration of all of the relevant circumstances. In general, no single factor or trait relevant to character is a per se bar to the issuance or retention of a license. For example, evidence of a poor compliance record must be evaluated in conjunction with subsequent corrective actions.[5] The FCC has held that even criminal misconduct may be outweighed by the longstanding "uncommonly good" and "meritorious" record of an applicant.[6]

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[5] Virginia Electric and Power Co. (North Anna Nuclear Power Station, Units 1 and 2), LBP-77-68, 6 NRC 1127, 1150-1151 (1977), reaffirmed, LBP-78-10, 7 NRC 295, affirmed, ALAB-491, 8 NRC 245 (1978); Consumers Power Co. (Midland Plant, Units 1 and 2), ALAB-106, 6 AEC 182, 183-184 (1973).

[6] See Westinghouse Broadcasting Co., 44 F.C.C. 2778, 2780 (1962); General Electric Co., 45 F.C.C. 1592, 1594-1596 (1964).

Reorganization of management in an attempt to address problems which have been identified may be a relevant mitigating factor.[7] In the case of judging the character of a corporation, removal of an individual responsible for misconduct may leave corporate character intact.[8] Indeed, the willingness of a company to remove top management officials who are or may be involved in wrongdoing reflects well on the sincerity of management in correcting deficiencies.[9]

As the ASLB in the South Texas proceeding recently noted in regard to corporate character:

> A change in corporate character can change an applicant's character, as can education and experience. . . . [I]f an applicant, whose character may have been unsatisfactory in the past, demonstrates a reformed and adequate present character, then we may find that there is reasonable assurance that it will observe the Commission's health and safety standards. LBP-84-13, supra, slip op. at 22-23.

The rationale for this is expressed well in Armored Carrier Corp. v. United States, 260 F. Supp. 612 (E.D.N.Y. 1966), affirmed, 386 U.S. 778, rehearing denied, 389 U.S. 924 (1967):

> The argument that past willful violations should, per se, bar a grant of authority in the present and for the future is one that looks backward and appears transfixed. Examination of the past should only be useful in assessing the prospective conduct of the applicant.

Only in extraordinary circumstances may an applicant's conduct be so opprobrious as to render the applicant unfit per se. For example, where the particular facts demonstrated that the misconduct in question consisted of willful deception of the agency on a grand scale or corrupt practices, an applicant's character may be tainted beyond redemption. See, e.g.,

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[7] North Anna, supra, 6 NRC 1127; Consumers Power Co. (Midland Plant, Units 1 and 2), LBP-74-71, 8 AEC 584 (1974), affirmed in pertinent part, ALAB-283, 2 NRC 11 (1975).

[8] See, e.g., Niagara Mohawk Power Corp. (Nine Mile Point Nuclear Station) Orders at 45 FR 80334-80336 (Dec. 4, 1980) and 46 FR 20341-20342 (April 3, 1981); cf. TMI-1, ALAB-772, supra, slip op. at 24 n. 17, 42-43, 59 (unnecessary to address sanctions where involved personnel are no longer employed or used in sensitive positions).

[9] See, e.g., RKO General, Inc., 78 F.C.C. 2d 1 at 110 (1980).

Continental Broadcasting v. F.C.C., 439 F.2d 580 (D.C. Cir.) cert. denied, 403 U.S. 909 (1971) (139 spurious documents submitted to Commission by station manager); Public Service Television, Inc. v. F.C.C., 317 F.2d 900 (D.C. Cir. 1962) (applicant tried, in prior proceeding for license for same channel, to corruptly influence the hearing official). In these extreme cases, the evaluation of character, and whether it could be redeemed, focused on specific individuals, rather than a corporate entity. Assumedly, personnel changes can always cure defects in corporate character.

Absent such egregious misbehavior, even where an applicant has engaged in willful misconduct, it has been held that an agency does not abuse its discretion in granting a license upon determining that the applicant's conduct (and character) has improved so as now to be in compliance with regulatory requirements. See, e.g., Central Florida Enterprise Inc. v. F.C.C., 683 F.2d 503 (D.C. Cir. 1982) (license renewed despite willful violation of Commission rule); Cumberland Broadcasting Corp. v. F.C.C., 647 F.2d 1341 (D.C. Cir. 1980) (license granted despite applicant acquiescence in attorney misconduct); Kidd v. F.C.C., 302 F.2d 873 (D. C. Cir. 1962) (construction permit granted despite applicant's knowing and willful violations, misrepresentations, and concealments in conducting test operations); Bray Lines, Inc. v. United States, 353 F. Supp. 1240 (W. D. Okla.), affirmed 414 U.S. 802 (1973) (carrier authorized to transport explosives despite its having been held in contempt and punished for violating court order); Slay Transportation Co. v. United States, 353 F. Supp. 555 (E.D. Mo. 1973) (carrier issued certificate despite engaging in illegal tacking operation); Armored Carrier Corp. v. United States, 260 F. Supp. 612 (E.D.N.Y. 1966), affirmed 386 U.S. 778, rehearing denied, 389 U.S. 924 (1967) (carrier authorized to deliver in certain counties despite its previous unauthorized deliveries in same counties); cf. Midland, ALAB-106, supra; North Anna, LBP-77-68, supra; Shearon Harris, LBP-79-19, supra.

The question of individual versus organizational character was addressed by the ASLB in the recent South Texas decision. LBP-84-13, supra, slip op. at 24-25. While noting that organizations necessarily conduct their activities through individuals,[10] the ASLB stated that the failure of one or more individuals to demonstrate adequate character does not per se indicate a lack of organizational character. The ASLB also stated that "only a limited group of corporate employees may truly be regarded as exercising a sufficient degree of responsibility so as to be deemed to affect an organization's character." The ASLB concluded as follows:

> [W]e must therefore evaluate such factors as the role of particular individuals in the organization, the responsibilities which they exercise, the seriousness and frequency

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[10] A licensee cannot avoid responsibility for violations by its agents or employees. See Atlantic Research Corporation, CLI-80-7, 11 NRC 413, 422 (1980); 49 FR 8583, 8589 (March 8, 1984) ("Generally, however, licensees are held responsible for the acts of their employees.")

> of any deficiencies attributable to them, and the steps taken by the organization when deficiencies are discovered. Our final judgment . . . . must balance all of these factors.

Another Federal agency has summarized the character inquiry in a way that applies equally well to the NRC licensing process:

> The determination as to whether an applicant has sustained its burden of establishing its fitness must be made upon a full consideration of the nature and extent of the violation committeed by applicant, the mitigating circumstances, if any, shown to exist and to have existed, whether applicant's conduct represents a flagrant and persistent disregard of the provisions of the act and of its certificates, whether applicant has made a sincere effort to correct past mistakes, [and] whether applicant is willing and able to comport in the future with the statute and the applicable rules and regulations of the Commission.[11]

In sum, the NRC is authorized by the Atomic Energy Act to assess the character (or management integrity) of an applicant or licensee in determining whether a license should be issued or retained. This assessment has included an evaluation of specific factors which bear a rational relationship to an applicant's or licensee's ability to carry out faithfully the responsibilities imposed by the license and regulations. Among the factors which have been evaluated by this agency are candor and truthfulness, management attitude, and the record of compliance with legal requirements. A determination concerning an applicant's or licensee's character is subjective and judgmental, and is based on the totality of circumstances. The inquiry is compounded, and difficult to answer, when the licensee (or applicant) is a corporation and where the question is the extent to which past acts of responsible individuals reflect on current acceptability. The assessment of character is part of the NRC's overall evaluation of whether there is reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. This determination may in particular circumstances result in the denial of a license application or the suspension or revocation of a license.

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[11] Miller Transfer and Rigging Co., Extension of Metal Lathes, 125 M.C.C. 538, 543-544 (1976).

13.0 STAFF POSITION ON MANAGEMENT INTEGRITY

The staff informed the Commission on April 18, 1983, that the staff found it necessary to revalidate its position on licensee's management integrity (see memoranda, dated May 19, 1983 and July 15, 1983, from the Executive Director of Operations, W. J. Dircks, to the Commission). In Sections 4.0 through 11.0, the staff has reviewed the evidence on each of the subjects previously identified by the staff as relevant and material to management integrity. For the majority of the matters previously evaluated, the staff found that they did not raise questions concerning management integrity. However, in several of the detailed sections, matters have been identified that impact negatively on GPUN's corporate character. These negative matters are evaluated individually and collectively in reaching a staff position on whether GPUN's character (i.e., management integrity) provides reasonable assurance that the licensee can and will protect public health and safety. Section 13.0 evaluates these matters in conjunction with the legal standards discussed in Section 12.0. The discussion in this section is divided into the staff's position on corporate integrity and on individual integrity.

13.1 Staff Position on Corporate Integrity

As discussed in Section 12.0, the development of a staff position on management integrity requires an evaluation that balances such factors as the nature and seriousness of past performance failures, the positions of responsible individuals within the licensee's organization, the remedial actions taken to provide reasonable assurance of satisfactory future performance, and, where available, information concerning the success or failure of the remedial actions taken.

A significant change in the licensee's corporate organization became effective on January 1, 1982. The staff's evaluation of licensee's management integrity must, therefore, evaluate the effect that the formation of GPUN has had on the licensee's performance. Accordingly, the staff divides its discussion of improper activities related to management integrity into Met-Ed events and GPUN events.

13.1.1 Matters Relating to Met-Ed Management Integrity

The staff will first consider Met-Ed's responsibility for improper acts individually and then will consider whether a pattern emerges when these acts are considered collectively. The following four matters are considered relevant and material to the staff's finding on management integrity within the Metropolitan-Edison Company:

(1) TMI-2 leak rate falsification (see Section 5.2)

(2) preaccident training irregularities and postaccident cheating (see Sections 7.3.1 and 7.3.2)

(3) false certification to NRC of Floyd's requalification program participation and management coverup (Section 7.3.2)

(4) lack of accuracy and completeness in the licensee's responses to NRC's Notice of Violation (Section 8.3.3)

The staff concludes that these four matters involved Met-Ed senior management (in some cases corporate management) and that the actions of the individuals involved included negligence with respect to their responsibilities, careless disregard of their responsibilities, and an attempt to cover up an individual's act that demonstrated deliberate disregard of responsibility on the part of that individual. These events are discussed individually and then an overall staff conclusion is presented.

TMI-2 Leak Rate Falsification

The staff finds, in Section 5.2.3, that the following facts are supported by the NRC's investigation (i.e., both IE in 1980 and OI in 1983-1984) and by the prosecuting attorney's Statement of Fact read into the record as a part of the U.S. v. Met-Ed trial settlement:

(1) Some operators willfully violated procedures and attempted to manipulate leak rate test results by the addition of hydrogen and/or water to the makeup tank. These operators were motivated to do so as a result of indirect pressure from management and/or a desire by individual operators to obtain satisfactory leak rate test results.

(2) The identified leak rate increased as a result of leakage through the pressurizer relief valves, and it became more difficult for the operators to obtain satisfactory leak rate test results. First-line supervision (i.e., shift foremen and shift supervisors) were knowledgeable of the difficulties operators were experiencing in obtaining satisfactory test results for unidentified reactor coolant pressure boundary leakage on TMI-2. Because of the difficulty in obtaining satisfactory results, the control room operators would run leak rate tests frequently and also would discard those results that indicated unacceptable leak rates. It was not uncommon to run the test several times on the same shift.

(3) Operators regarded the leak rate test as unreliable and ineffective for determining actual unidentified leak rate. The test procedure developed by the licensee was ineffective in demonstrating conformance with requirements of the Technical Specifications.

The staff also finds that the licensee should have made a Board notification concerning the licensee's investigation into the Hartman allegations (the Faegre & Benson Report) as new information relevant and material to issues pending in the TMI-1 restart proceeding.

These facts support the staff's conclusion that first-line supervision and possibly middle management was directly involved in leak rate falsification at TMI-2. The staff also concludes that Met-Ed was responsible for improper leak rate testing as well as for the poor attitudes of operators and first-line supervisors toward this test.

Preaccident Training Irregularities and Postaccident Cheating

During the period of late 1975 through April 1976, some off-shift licensed operators (among whom were the station manager and TMI-1 and -2 plant managers) failed to meet requalification program requirements. These requirements related to frequency of watch standing and attendance at scheduled training lectures. Additional evidence exists in the preaccident time frame that demonstrates poor implementation of the requalification training program and a poor attitude on the part of shift operators toward this program.

The instances of cheating on NRC examinations as well as on operator requalification program examinations, during the postaccident period, is evidence that the poor attitude toward requalification training continued. Management personnel were directly involved in cheating (*i.e.*, supervisor of operations for TMI-2, shift supervisors and foremen).

The staff finds that the licensee's preaccident requalification training program was deficient; it failed to meet NRC requirements; and management failed to notify NRC of these deficiencies and failures to meet NRC requirements. The staff is not primarily concerned, at this late date, with possible violations of NRC requalification training requirements in 1975 through 1978. However, the staff is concerned that these deficiencies and failures indicate a poor attitude and disregard on the part of management at that time for their responsibilities and that this same management held responsible positions *vis-a-vis* TMI-1 operations in the postaccident period. The postaccident occurrence of cheating on requalification program examinations is evidence of a poor attitude on the part of some managers and licensed operators toward their responsibilities. Management is clearly responsible for establishing programs and exemplifying, through leadership, a positive attitude, which will, in turn, create a good attitude on the part of operators toward their responsibilities. The staff concludes that Met-Ed as a result of negligence failed to fulfill their responsibility.

False Certification and Management Involvement in the Coverup of Cheating

The staff finds (*see* Section 7.2.3) that licensee management knew of, and subsequently covered up, Floyd's cheating on his requalification program examination and that the licensee knowingly made a false certification to the NRC of Floyd's satisfactory completion of his requalification program requirements.

In July 1979 the licensee discovered that the TMI-2 Supervisor of Operations (Floyd) submitted answers to questions in his annual requalification examination that were written by another operator. Floyd was recently indicted in connection with this episode. Miller advised Herbein by a handwritten memorandum dated July 3, 1979, that "Floyd just handed in his overdue FSR exams," that he failed two sections, and that "one exam is not in his handwriting." Miller confirmed that he wrote the memorandum and discussed it with Herbein.

Senior Met-Ed management (Miller, Zechman, et al.), at the direction of corporate management (Herbein), conducted an investigation into the Floyd cheating event and recognized its relationship to Floyd's NRC license requirements. Met-Ed management (Miller and Herbein) discussed the issue of Floyd's certification of completion of NRC requalification program requirements following their investigation. Herbein told Miller to clear the certification letter with counsel before submitting it to the NRC. Miller's memorandum of July 27, 1979, to counsel highlighted the "handwriting problem" (i.e., that portions of Floyd's examination were written by another individual) and stated that this section of the examination was not being mentioned in the draft certification letter; a copy of the draft was attached. The actual certification letter was submitted to the NRC on August 3, 1979. It certified the successful completion of Floyd's accelerated requalification program requirements. On August 8, 1979, Miller advised Arnold, by letter, of the results of his investigation into the Floyd incident and recommended that Floyd be suspended. Floyd's cheating was not reported to the NRC for 2 years, when Arnold brought the matter to the attention of the NRC after an NRC investigation (July 1981, HQS-81-003) was initiated into other instances of cheating on an NRC-administered examination. As a result of the reopened proceeding on cheating, the ASLB made a recommendation that OI investigate the licensee's false material statement concerning Floyd's certification. Subsequent to the OI investigation IE concluded that a willful material false statement had been made and a civil penalty of $100,000 was proposed by the Director, IE.

The staff concludes that licensee management covered up Floyd's cheating and made a subsequent false certification to the NRC and that these acts demonstrate a deliberate disregard of management responsibilities.

Accuracy and Completeness of Licensee Response to the NOV

The staff finds (see Section 8.3.3) that the licensee's response to the NRC's Notice of Violation (NOV) is inaccurate and incomplete in two areas and is questionable in a third area. The staff finds the licensee's response, which stated that the operators were not desensitized to high tail pipe temperatures before the accident, is inaccurate and incomplete. The licensee's response ignored the statements of the operators themselves following the accident, did not consider the contrary conclusions reached by other members of the licensee's organization, and was based on their postaccident analysis of tail pipe temperature data.

The second area concerns the licensee's rationale for his assertion that the procedure for a leaking power-operated relief valve was not violated. This rationale is contrary to statements made by the TMI-2 Unit Superintendent and Station Superintendent as well as other licensed operators. These individuals were responsible for carrying out the procedure. The licensee's position that a preaccident determination had been made that a code safety valve and not the power-operated relief valve (PORV) was leaking is not supported by the evidence. To the contrary, it appears there was considerable doubt as to which valve was leaking before the accident. An after-the-fact, technical analysis showing that a safety valve was leaking and the PORV was not, even if correct, does not alter the fact that the operators and management did not know which valve was leaking and consciously chose not to follow the applicable procedure.

The third area in which the response to the NOV raises questions about the licensee's attitude toward its regulatory responsibilities concerns the isolation of the emergency feedwater system during the performance of surveillance testing. The licensee's response indicated that this is not a violation of the Technical Specifications. The Keaten task force concluded that the isolation of the emergency feedwater system was clearly a violation of the intent of the Technical Specifications even though the wording in the Technical Specifications may be ambiguous and subject to interpretation. The licensee's response to the NOV did not indicate a violation of intent; the licensee took the position that there was no violation. NRC expects licensees to operate their facilities safely and to operate them within the intent, as well as the letter, of the license and not to utilize ambiguous words to justify improper acts.

These inaccurate, incomplete, and questionable statements in the licensee's response to the NOV raise serious questions about the staff's ability to rely on statements made by Met-Ed. The NOV response was prepared by the Manager of Licensing for TMI, was signed by a Vice-President of the company, and was reviewed by the President of GPU before it was issued to the NRC.

13.1.2 Staff Conclusion on Met-Ed Management Integrity

Metropolitan-Edison Company clearly bears the responsibility for these improper acts on the part of first-line supervisors, senior managers, and corporate officers within the company and within the company's support organization, GPU Service Company. The four events discussed above, taken individually, raise serious questions about management's character and willingness to fulfill its responsibilities as an NRC licensee. Evaluated collectively, the four matters indicate: a pattern of poor attitude toward training responsibilities and leak rate testing requirements, a failure to provide accurate and complete statements to the NRC, an unwillingness to admit violations of NRC requirements and a failure to promptly report cheating and its subsequent coverup. This pattern of activity on the part of the Met-Ed, had it been known at the time, would likely have resulted in a conclusion by the staff that the licensee had not met the standard of reasonable assurance of no undue risk to public health and safety. However, these matters, or the significant facts concerning these matters, were not known to the NRC staff during the ASLB's proceeding on TMI-1 restart.

13.1.3 Events Relating to GPUN Management Integrity

Effective on January 1, 1982, the nuclear-related operations of GPU were reorganized under GPUN. As the successor to Met-Ed, GPUN must bear the responsibility for the improper activities discussed above. Two additional events have occurred since the formation of GPUN that must also be considered material to GPUN's management integrity:

(1) harassment of Parks and the failure to implement adequate procedures to assure the protection of both GPUN and contractor employees from acts of discrimination for raising issues of public health and safety (Sections 10.3.1 and 10.3.4)

(2) GPUN's failure to provide BETA, RHR, and Faegre & Benson Reports in a timely manner (Sections 5.7 and 6.3)

Harassment of Parks

The staff finds (see Section 10.3.1) that GPUN is responsible for the harassment of Parks by Bechtel. This finding is based on not only a derived responsibility because Bechtel is a subcontractor to GPUN but is also based on a direct responsibility on the part of GPUN because of the unique Bechtel/GPUN management team at TMI-2 at the time Parks raised his safety concerns. However, the staff finds that the two other individuals who raised safety concerns about the polar crane in conjunction with Parks and who were GPUN employees, were not harassed. The record developed by OI supports a finding that GPUN corporate management was sensitive to its responsibilities for protecting these employees.

Reportability Issues

The staff finds (see Sections 5.7 and 6.3) that the licensee failed to provide BETA, RHR, and Faegre & Benson Reports in a timely manner.

13.1.4 Staff Conclusion on GPUN Management Integrity

In summary, the staff finds that GPUN bears successor responsibility for the following improper activities of Met-Ed:

(1) TMI-2 leak rate falsification and failure to report the Faegre & Benson report

(2) preaccident training irregularities and postaccident cheating

(3) false certification to NRC of Floyd's requalification program participation and management coverup thereof

(4) lack of accuracy and completeness in the licensee's response to the NOV

The staff finds further that GPUN bears responsibility for the harassment of Parks and the failure to report the BETA, RHR, and Faegre & Benson Reports. As discussed in Section 12, however, the evaluation of management integrity does not involve a mere litany of past wrongdoing. The staff must also assess the licensee's remedial actions, balance the improper activities in light of such remedial action and subsequent performance, and determine whether all of the circumstances taken together permit a conclusion that there is reasonable assurance of no undue risk to public health and safety.

The improper activities for which GPUN holds successor responsibility include several serious matters that weigh heavily against the licensee. Leak rate falsification and postaccident cheating on operator examinations, both of which undermine the ability of the NRC to regulate licensed activities, were the result of an atmosphere or attitude for which management was responsible. The false certification and the associated coverup and the inaccurate and incomplete response to the NOV are graver still, indicating that Met-Ed was unable or unwilling to communicate truthfully and candidly with the NRC. All of these activities occurred prior to the formation of GPUN. Since then, the events relating to the harassment of Parks and the failure to report the BETA, RHR, and Faegre & Benson* Reports pose questions about the adequacy of licensee's implementation of Commission requirements. These latter events, in the staff's view, are clearly different in nature and degree from the Met-Ed activities discussed above and do not raise programmatic concerns as to possible widespread implementation deficiencies.

These improper activities must be evaluated in conjunction with the licensees remedial actions and subsequent performance. The staff views the reorganization and consolidation of GPU's nuclear activities into GPUN as a significant remedial action which has improved the licensee's performance. See the staff's January 3, 1984, memorandum to the Commission. A further reorganization plan was submitted by the licensee on June 10, 1983 which involved:

(1) realignment of personnel so as to minimize involvement at TMI-1 of personnel who had preaccident involvement at TMI-2

(2) full-time, on-shift operational QA coverage by degreed engineers

(3) realignment of functions within the office of the president of GPUN

On November 10, 1983, the licensee announced that this reorganization plan had been implemented and that:

(1) three outside directors would be added to the GPUN Board of Directors and would also make up a separately staffed and funded Nuclear Safety and Compliance Committee (NSCC).**

(2) R. C. Arnold had resigned as president of GPUN

(3) P. R. Clark, Sr., had become president of GPUN

(4) E. E. Kintner had replaced Clark as Executive Vice-President of GPUN

Also, weighing in favor of the licensee are remedial actions taken as a result of past improper activities (see Sections 4.0 through 11.0) and past deficiencies (see generally, TMI-1 Restart SER and Supplements 1 through 4). For example:

- management initiative in seeking outside review of its activities (BETA Report)
- personal involvement of top management in interviewing and ensuring that licensed operators understand that cheating is a grave violation of corporate policy and will not be tolerated

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*The Faegre & Benson Report was initially withheld by Met-Ed; however, subsequent reporting by GPUN was not timely.

**By letter dated June 29, 1984, the licensee reported that the NSCC is in place and beginning to function.

- establishment of 1 week out of 6 weeks dedicated to training, which in conjunction with a six-shift rotation, resolves the concerns identified in the Knoll and Book memoranda

- changes in training program content, structure, and policy, with substantial additional resources dedicated to the effective implementation of the training program

- initiation of an independent evaluation of operator attitudes (RHR Report) and effective implementation of programs responsive to operator concerns such as the abnormal transient operational guidelines (ATOG) procedure review, development, and implementation (The staff evaluated, at the point of delivery, the classroom and simulator training on the ATOG emergency procedures and found it to be effective.)

- major improvement in the effectiveness of the startup and test program for TMI-1, which was based, in part, on the Lucien Report findings and recommendations

- effective implementation of many of the recommendations from the Keaten Report which are evidenced by the substantial improvement in licensee regulatory performance, the Rickover evaluation* of licensee performance, and the Institute of Nuclear Power Operations (INPO) evaluation of TMI performance

- The myriad of facility design changes and modifications that have been engineered and implemented by the licensee to correct specific deficiencies identified by the various investigations into the TMI-2 accident. (The staff acknowledges that many of these corrective actions were required by NRC, however, the fact that a change was required by NRC does not detract from the thoroughness or quality of the licensee's engineering and implementation of such requirements, nor is the licensee's completion record significantly different from that of other utilities.)

The staff also weighs in the licensee's favor the record of performance it has demonstrated since the formation of GPUN in 1982. The staff's Systematic Assessment of Licensee Performance (SALP) for the licensee for the periods October 1, 1981, through September 30, 1982, and October 1, 1982, through January 31, 1984, have been very favorable. The staff concluded in its SALP report on the period October 1, 1981, through September 30, 1982, that:

> Overall, we find your performance of licensed activities indicates a high degree of management attention and involvement and that it is aggressive and oriented toward nuclear safety, with adequate application of resources.

Seven of the ten functional areas evaluated were assessed as Category 1 (high level of performance); the remaining three functional areas were rated as Category 2 (satisfactory performance).

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*"An Assessment of the GPU Nuclear Corporation Organization and Senior Management and Its Competence to Operate TMI-1;" Admiral H. G. Rickover, USN; November 19, 1983.

The results of the most recent SALP assessment, for the period October 1, 1982, through January 31, 1984, were summarized by the staff as follows:

> Overall, this assessment found that the licensee is continuing to devote considerable resources to improve performance in all areas of the organization. Management attention in identifying and correcting weaknesses is apparent from licensee initiatives noted in the various areas reviewed. Management's commitment to safety is also apparent from their extensive commitment to personnel training, the continuing efforts to staff the organization with highly technical, competent personnel, and the implementation of a stringent policy regarding procedural adherence.

The staff rated the licensee's performance in the following areas as Category 1: radiological controls, maintenance, preoperational/surveillance testing, fire protection and housekeeping, emergency preparedness, security and safeguards, and quality assurance/control. The other areas evaluated were rated as Category 2: plant operations; design, engineering and modifications; and licensing activities.

The ability of any agency to regulate licensed activities depends on the accuracy and completeness of a licensee's reports and the licensee's willingness to discover potential public health and safety issues. This is particularly true when regulating a complex technical area involving numerous scientific and engineering disciplines. Current GPUN policy and practice with respect to accuracy and completeness of reports to NRC, in light of past Met-Ed failures, is critical to the staff's overall evaluation of management integrity. Similarly, GPUN policies that protect employees from harassment are a measure of the company's willingness to discover and openly address potential public health and safety issues. Documentation and response to NRC's questions that establish GPUN's policies in these areas were provided under oath by P. R. Clark, President of GPUN. See P. R. Clark letter to D. Eisenhut, Director, Division of Licensing, NRR, dated June 29, 1984, with attached response to NRC questions. GPUN policy is to "assure absolute openness of information availability and exchange within GPUN so as to assure that all information which might affect safety of nuclear activities is available to responsible company officials" and to "[p]rovide information in a timely and trustworthy manner on the activities and operations of TMI-1 and TMI-2 and Oyster Creek to the various publics of GPU; i.e., public officials, the media, the general public, employees, share holders and governmental agencies" (Id. at 2). There are similar strong policy statements in recent letters to all GPUN employees engaged in nuclear activities. For example, P. Clark's letter of December 8, 1983, emphasized "the need to have full and open communications, both within the company, and between us and our regulators," and his letter of February 27, 1984, which stated ". . . in addition to identifying issues internally, we will keep the NRC fully informed of problems, difficulties and questions."

The staff finds that these policies are clear and that they reflect GPUN's understanding of their responsibilities to communicate accurately and completely with NRC. The staff also believes that a sincere effort to promulgate these policies has been made by the President of GPUN.

The staff concluded in Section 10.3.1 that GPUN failed in its responsibility to protect Parks, a contractor employee, from discrimination (i.e., harrassment) for raising safety concerns. The staff also concluded in Section 10.3.4 that GPUN policies which protect GPUN and contractor employees from harassment were not understood by some senior GPUN managers nor its contractor (Bechtel). GPUN admitted that they did not review or investigate the relationship between Parks and his employer, Bechtel, as it related to the questioning of Parks by Bechtel employees or Parks' supervisor. Id. at 6. The Stier Report (May 18, 1984, OI Report Ex. 102), although it does review twc of Parks complaints in Volume 4, is incomplete in its review of Park's allegation of harassment. The staff concludes that GPUN abdicated its responsibility to investigate Parks allegation of harassment and ensure appropriate remedial measures. The staff finds, however, that the deficiencies exhibited in the Parks matter were isolated occurrences and are not programmatic in nature. In this SER, the staff investigated three other allegations of discrimination against GPUN employees who had raised safety concerns. In each of those three cases (Hartman, Gischel, King), the staff found the allegations to be without merit and that GPUN had acted properly in its dealings with these employees.

In reviewing the attachment to GPUN's June 29, 1984 letter, it is clear that corporate management has promulgated policies designed to protect employees who raise safety concerns, whether they are GPUN or contractor employees. In particular, the "lessons learned" from the Stier Report (Attachment 6) highlights its current view of how employees raising safety concerns are to be treated. "Where differences of opinions arise, such differences must be recognized and resolved on their merits in a cooperative manner. They must not be characterized or treated as differences due to their organizational background or personality conflict." Additionally, GPUN has a strong written commitment to deal appropriately with employees or contractors who discriminate against employees for engaging in activities covered by 10 CFR 50.7.

Finally, and most importantly, the staff finds that the individuals currently responsible for the leadership of GPUN were not implicated in past wrongdoing on the part of Met-Ed and have made a major contribution to the improved performance of GPUN. This finding is discussed in detail for each current GPUN official involved or potentially implicated in any of these matters in Section 13.2.

Based on all of the information reviewed by the staff and balancing the past improper activities of the licensee against its subsequent record of remedial actions and performance, as well as the record of current senior management of the licensee, the staff concludes that there is reasonable assurance that GPUN can and will conduct its licensed activities in accordance with regulatory requirements and that GPUN can and will operate TMI-1 without undue risk to the health and safety of the public.

13.2 Staff Position on Individual Integrity

In addition to evaluating the activities discussed in Sections 4.0 through 11.0 to arrive at a position on corporate character or integrity, the staff has considered the implications of those activities in terms of the fitness of particular individuals to hold responsible positions related to NRC-licensed activities. The staff emphasizes that its assessment of the "managerial integrity" of the individuals addressed in this section does not reflect a judgment about the personal morals or ethics of any individual. The staff's assessment of individual "managerial integrity" is, instead, a subjective decision by the staff as to whether there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with the particular individual in a position related to those responsibilities.

Individuals are obviously responsible for activities in which they have had direct involvement. An individual's position in the management structure, however, may also result in responsibility for activities within his supervision. Depending on the particular circumstances, an individual in a senior corporate management position may be deemed responsible in some part for a wide range of corporate activities in which the individual played no direct role.

13.2.1 Current GPU/GPUN/TMI-1 Management

As discussed in Section 13.1, the staff has concluded that improper activities by Met-Ed in four areas raise serious integrity questions. Individuals currently with GPUN, who held management positions within Met-Ed or GPUSC, may be responsible for these improper acts. This responsibility may involve either an active role in commission of the event or a supervisory role with respect to the acts of subordinates. Current GPUN management who previously held management positions within Met-Ed or GPUSC and who may be held responsible for improper acts of Met-Ed are the following:

W. G. Kuhns, Chairman of the Board and Chief Executive Officer, GPU
H. M. Dieckamp, President GPU
P. R. Clark, Sr., President GPUN
R. L. Long, Vice-President Nuclear Assurance, GPUN
H. D. Hukill, Vice-President TMI-1, GPUN
M. Ross, Operations Manager, TMI-1, GPUN
J. J. Colitz, Plant Engineering Director, TMI-1, GPUN
B. Mehler, Manager Radwaste Operations, TMI, GPUN

Table 13.1 indicates the involvement of these individuals in Met-Ed and GPUN events that could reasonably be considered to relate to their managerial integrity. While the staff does not find that the GPUN events (i.e., harassment of Parks and failure to provide RHR, BETA, and Faegre & Benson Reports in a timely manner) are significant factors in evaluating GPUN's management integrity, it has included these events for the purpose of assessing events that may be considered by others to be more significant.

W. G. Kuhns

The staff finds that Kuhns had no personal involvement in any of the events which raised questions concerning Met-Ed or GPUN management integrity. As Chairman and Chief Executive Officer of the Board of Directors of GPU and a Director of GPUN, Mr. Kuhns must shoulder some portion of the responsibility for the improper activities of GPU's subsidiaries, Met-Ed, GPUSC, and GPUN. As discussed in Section 13.1 above, however, the staff has concluded

Table 13.1 Individual integrity of current GPU of GPUN officers and employees

Name & Position	Events						Conclusion
	TMI-2 Leak rate	Pre- & Post-Accident Training	False Certification & Management Coverup	Complete & Accurate NOV Response	Timely Provision of BETA/RHR Reports	Harassment of Parks	
W. G. Kuhns CEO GPU	-	-	-	-	-	-	No Personal Involvement
H. M. Dieckamp Pres. GPU	-	-	-	Yes	-	-	Personal Involvement Not Improper
P. R. Clark, Sr. Pres. GPUN	-	-	-	-	Yes	-	Personal Involvement Not Improper
R. L. Long V.P. Nuclear Assurance	-	Yes	-	-	-	-	Personal Involvement Not Improper
H. D. Hukill, Jr. V.P. TMI-1	-	-	-	-	Yes	-	Personal Involvement Not Improper
M. Ross Mgr. Operations TMI-1	Yes	Yes	-	-	-	-	Personal Involvement Not Improper
J. Colitz Eng. Dir. TMI-1	-	Yes	-	-	-	-	Personal Involvement Not Improper
B. Mehler Manager, Radwaste Operations TMI	Yes*	-	-	-	-	-	Insufficient Evidence

*Hartman ECP allegation included.

YES = Individual directly involved or implicated
- = Individual not involved

that GPU/GPUN has by its performance (i.e., the creation of GPU Nuclear Corporation and its improved regulatory performance as demonstrated by past two SALP reports) demonstrated a sincere and successful effort to correct for past mistakes. Kuhns' personal efforts and success at augmenting the board of directors with individuals of recognized nuclear experience and integrity is a further indication of his positive actions to assure that GPU and GPUN meet their public health and safety responsibilities. For the reasons discussed, the staff revalidates its position with respect to Kuhns and concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with Kuhns in a management position related to those responsibilities with no undue risk to public health and safety.

H. M. Dieckamp

The staff found, in Section 8.3, that Dieckamp was involved in review of the licensees response to the Notice of Violation. Dieckamp stated that he thought the NOV response that isolation of the emergency feedwater system was not a violation of the Technical Specifications was "kind of thin," however, he chose not to intervene. Evidence was not developed that would indicate Dieckamp's involvement in reviewing the response to the NOV was improper nor was any evidence developed which would indicate Dieckamp had personal knowledge that the response was inaccurate, incomplete or contrary to conclusions reached by others within Met-Ed or GPUSC. The staff finds that Dieckamp's involvement in the licensee's response to the NOV was not improper and that he had no involvement in any of the other events which raise questions concerning management integrity. However, Dieckamp bears responsibility for the action of his subordinates and companies over which he had direct supervisory responsibility. As discussed in Section 13.1 above, the staff concluded that a pattern of improper acts by Met-Ed in 1981 and before are so serious with respect to licensees' character, that the staff would likely have concluded that reasonable assurance of no undue risk to public health and safety was not provided. It follows, therefore, that Dieckamp had not met his responsibilities in 1981 and before that time.

The staff's evaluation of Dieckamp's managerial integrity must be based on a consideration of all of the relevant circumstances. Additional relevant circumstances in this instance are: The creation of GPUN to address past problems on the part of Met-Ed, the reassignment to non-nuclear activities of company officers responsible for past Met-Ed actions, and most important, the current conduct and performance of GPUN. Clearly, examination of past conduct of Met-Ed is relevant in assessing the prospective conduct of GPUN. However, since GPUN has been in existence since January 1982, GPUN's conduct is more relevant and, therefore, should be given more weight. The staff found in Section 13.1 that GPUN performance did not raise questions concerning corporate integrity and that regulatory performance had substantially improved over that of Met-Ed. In balancing these relevant factors and considering that Dieckamp was not personally involved in improper activities, the staff finds that the weight of evidence supports revalidation of its position--there is reasonable assurance that GPUN can and will meet its regulatory responsibility with no undue risk to public health and safety with Dieckamp in a management position related to those responsibilities.

P. R. Clark, Sr.

P. R. Clark joined GPU Service Corporation as Vice-President Nuclear Activities on January 20, 1980. He became the Executive Vice-President, GPUN on January 1, 1982, when that corporation was formed. Clark was essentially the Deputy to Arnold for all nuclear activities. On November 25, 1983, Clark became President of GPUN.

Clark testified that while he was Deputy to Arnold, areas of concentration were established in which he or Arnold would take lead responsibility in day-to-day oversight of different aspects of the company's operations (see OI Keaten Ex. 18 at 5). Before the licensee's proposal of June 10, 1983, to separate individuals associated with TMI-2 prior to the accident from any responsibilities with TMI-1, Clark's responsibilities were largely concerned with the Oyster Creek Nuclear Power Plant and Arnold concentrated on TMI-1 and -2. The evidence developed during the various OI investigations into matters that raised questions concerning Met-Ed management integrity would support this division of responsibility within the President's Office of GPUN and the working relationship that existed between Arnold and Clark. Clark was employed by GPUSC at the time of the cheating incidents (discussed in Sections 7.2 and 13.1); however, the facts have established that Arnold and Hukill, to their credit, became personally involved in the licensee's investigation and followup actions. No evidence was developed that would implicate Clark in any activities associated with the cheating events. Similarly, Clark was a vice-president in GPUSC, at the time various Keaten draft reports were forwarded for management review. No evidence was developed during the OI investigation of the Keaten matter that would indicate Clark was involved in any improper activities or had more than a peripheral role in review of the Keaten Report. The prosecuting attorney's Statement of Facts explicitly cleared Clark of any involvement in the TMI-2 leak rate issue. As discussed in Sections 5.7 and 6.3, the staff finds that the RHR and BETA and Faegre & Benson reportability issues are not significant factors in evaluating GPUN management integrity; rather, they indicate a failure to implement adequate procedures to ensure review of information for reportability. Thus, responsibility, if any, on the part of Clark would be limited to the corporation's failure after November 25, 1983, to adopt procedures to ensure the timely review and determination of information reportability. The staff finds, therefore, that Clark was not involved in any improper activities (Section 13.1 above). The staff concludes that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Clark in a management position related to those responsibilities.

R. L. Long

R. L. Long was appointed Director of Training and Education and Acting Director of Nuclear Assurance on approximately February 1, 1980. On April 1, 1982, following the formation of GPUN, he became Vice-President of Nuclear Assurance.

The occurrences of cheating on NRC and licensee examinations, discussed in Section 7.2, are relevant and material to Long's managerial integrity. As discussed in Section 8.2, Long was also a member of the Keaten task force and was directly involved in review and comment on drafts of the licensee's internal investigation into the TMI-2 accident (i.e., Keaten Report). The staff found, however, that there was no improper activity on the part of the members of the Keaten task force nor was there any improper involvement on their part in the preparation of the licensee's response to the NOV (Section 8.3). The staff finds, therefore, that Long had no involvement in the inaccurate and incomplete statements made in response to the NRC Notice of Violation nor did he have any involvement in the other events that raise questions about management integrity, as discussed in Section 13.1.

The staff finds that Long did not have a personal involvement in cheating on NRC or licensee-administered examinations nor did he have direct responsibility for the poor attitude of operators toward their requalification program training requirements. The staff believes that this poor attitude on the part of operators was developed over a period of time and had its origins in the preaccident time frame. The licensee's actions to reorganize the Training Department and to learn from its past mistakes and to assess the practices of others (e.g., Roddis task force) is indicative of a sincere effort to improve the quality of the training program. Long's responsibilities included implementation of these initiatives to improve the quality of the licensee training efforts. With the exception of the examination process itself, the ASLAB has concluded that the licensee's training programs meet NRC's requirements. The ASLAB reopened the record on a narrowly defined issue concerning any impacts the cheating events may have on expert testimony presented during the ALAB hearing on the quality of the training program. The Boards found and the staff continues to agree that the remedial actions taken by the licensee to upgrade the examination process are proper and are responsive to prevent instances of cheating in the future.

The following factors are significant in evaluating Long's managerial integrity: his responsibility for cheating which occurred on licensee and NRC examinations, his role in implementing remedial actions for the overall training program (which the staff finds was a good faith effort on the part of the licensee to remedy past training deficiencies), the remedial actions directed by Long to preclude instances of cheating on future examinations, and, most importantly, the quality of the current training program that has been implemented under Long's direction. On balance, the staff finds that the quality of the current training program, as discussed in Section 7.3, outweighs the instances of cheating that occurred early in Long's tenure as Director of Training and Education. The staff concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Long in a management position related to those responsibilities.

H. D. Hukill, Jr.

H. D. Hukill reported to the Three Mile Island Station in June of 1980 and became Vice-President of TMI-1 in September 1980. Hukill was involved in two events that raised questions concerning corporate management integrity (see Section 13.1). These events are the licensee's investigation and followup action concerning cheating that occurred on licensee- and NRC-administered examinations and the licensee's failure to provide to NRC, in a timely manner, the RHR and BETA Reports. The staff finds that Hukill's involvement in these events was not improper. Hukill made a valuable contribution to the licensee's investigation by demonstrating to his staff that he was determined to correct the problem. The failure on his part to see the investigation through to the very end and his admission to being naive concerning cheating do not imply improper conduct (see PID, July 27, 1982 at ¶2269-2270, 2396). The record of investigation developed by OI supports a conclusion that Hukill felt the BETA and RHR Reports reflected positively on GPUN management initiative and that he volunteered these reports to the NRC on April 22, 1983. The staff finds these actions reflect favorably on Hukill's attitude and approach to responsibilities. The staff finds that there is no evidence in the various OI investigations related to Met-Ed or GPUN management integrity that would raise any questions on the part of a reasonable person as to Hukill's managerial integrity. The staff concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Hukill in a management position related to those responsibilities.

M. J. Ross

M. J. Ross is the Manager of Plant Operations for TMI-1 and has held that position since April of 1978. Before that time, he was a shift supervisor. Ross was alleged to have been involved in improper activities associated with the review of NRC examinations and possibly involved in cheating. An extensive record was developed during the reopened hearing on cheating concerning the charges against Ross. The Board found that the charges against Ross were unfounded. Similarly, the Appeal Board, after conducting its own extensive review and analysis of the record, concurred with the ASLB finding.

For the reasons discussed in Section 5.2, the staff concluded that no evidence exists to indicate that Ross was personally involved in leak rate testing. No testimony was given, during TMI-1 leak rate investigation or during the IE interviews as part of the TMI-2 leak rate investigation, to implicate Ross in actual wrongdoing or in pressuring operators to obtain acceptable leak rate test results. The contrast between the performance of leak rate testing on TMI-1 and TMI-2 and Ross' direct responsibility for the activities at TMI-1, reflect positively on Ross' management ability. The staff finds, therefore, that Ross' activities associated with leak rate testing were not improper.

One could argue that as Manager of Operations for TMI-1, Ross must bear some of the responsibility for the poor attitude on the part of subordinate licensed operators toward their requalification training program requirements. The occurrence of cheating on licensee and NRC examinations by licensed operators is, in the staff's opinion, reflective of a poor attitude on the part of operators. However, the responsibility for development of the training program and its implementation rests with others. Further, given the existence of widespread problems with respect to operator training before the accident, continuing implementation deficiencies in the postaccident training program, and the failure of Met-Ed to implement adequate training policy and programs, the staff believes it would be improper and unfair to hold Ross accountable for acts of cheating on the part of his subordinates during the postaccident period.

The staff concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Ross in a management position related to those responsibilities.

J. J. Colitz

J. J. Colitz is presently Director Plant Engineering, TMI-1. Colitz was the Superintendent of TMI-1 from early 1975 through March 1977 when he left to take a position with Met-Ed in Reading, Pennsylvania.

Colitz received his senior reactor operator's license on February 23, 1974; this license was renewed on February 23, 1976. Thus, he was a licensed, off-shift senior reactor operator at the time of the Tsaggaris memorandum, discussed in Section 7.1. During his OI interview on March 6, 1984, Colitz stated that he did not have time to attend lectures because of his workload as plant superintendent. Instead, he did makeup lessons (see OI Report 1-84-004, Ex. 11 at 1). The staff finds that Colitz may have failed to meet 50% lecture attendance for the FSR portion of his requalification program requirements (see Section 7.1). Colitz stated to OI that, after the Tsaggaris memorandum, he did not renew his operators license. However, his license had just been renewed 2 months before the Tsaggaris memorandum. The staff could find no record that his license was dropped after the Tsaggaris memorandum. Under similar circumstances, however, G. Miller's (Station Superintendent, Unit 2) license was dropped in October 1976. It appears likely that Colitz's license was allowed to drop at the same time as Miller's license. Based on the passage of time, the staff places no particular significance on Colitz's statement that he did not seek to renew his operator's license following the Tsaggaris memorandum.

The following matters are relevant to a staff position on Colitz's managerial integrity: lack of hard evidence of personal failure to meet NRC requirements, no evidence of poor attitude on the part of TMI-1 shift operators during his tenure as station manager, and circumstances of other, higher priority demands on his time. Considering these factors, the staff concludes that there is no basis for other than a positive finding with respect to Colitz's managerial integrity.

The staff concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to public health and safety with Colitz in a management position related to those responsibilities.

B. Mehler

The staff found in Section 5.3 that there was insufficient evidence to conclude that B. Mehler was involved in improper activities (i.e. violations of NRC requirements) during a reactor startup on April 23, 1978, as alleged by Hartman. Mehler was a dual-licensed SRO and Shift Supervisor before the TMI-2 accident and, thus, is involved in the TMI-2 leak rate matters. However, the staff is not aware of the evidence developed by the Department of Justice during its TMI-2 leak rate case that would implicate specific shift supervisors in improper acts. The staff finds, therefore, that there is insufficient evidence to implicate Mehler in improper acts.

The staff did not develop a record to evaluate these isolated events in light of subsequent performance. However, it is the licensee's responsibility to evaluate on a continuing basis the performance of its employees. The recent promotion of Mehler to Manager of Radwaste Operations by GPUN and the current record of GPUN's own performance is evidence that such a record, if developed, would likely be positive.

The staff concludes that there is reasonable assurance that GPUN can and will meet its regulatory responsibilities with no undue risk to the public health and safety with Mehler in a management position related to those responsibilities.

13.2.2 Past Met-Ed/GPUSC/GPUN Management

Past Met-Ed or GPUSC managers who were either responsible for or involved in events that call to question the management integrity of Met-Ed are

R. C. Arnold, Vice-President, GPUSC
J. Herbein, Vice-President, Metropolitan Edison
G. Miller, Station Manager, TMI, Met-Ed
E. Wallace, Manager of Licensing, TMI, GPUSC
J. Floyd, Supervisor Operations, TMI-2, Met-Ed
W. Zewe, Shift Supervisor, TMI, Met-Ed
G. Kunder, Superintendent, Technical Support, TMI-2, Met-Ed (12-78 to accident)
J. Seelinger, Superintendent, Technical Support, TMI-2, Met-Ed (1-77 to 11-78)

Table 13.2 indicates the involvement of these individuals in Met-Ed events.

The staff reaches no conclusion at this time on the managerial integrity of individuals who no longer hold management positions with GPUN. It is the staff's position, and an essential part of the staff's ability to revalidate its position on licensee's management integrity, that GPUN must obtain staff review and approval on a case-by-case basis prior to the assignment of any of these individuals (i.e., R. C. Arnold, J. Herbein, G. Miller, W. Zewe, J. Seelinger, and J. Floyd) to responsible management positions associated with supervision of operations or maintenance of NRC licensed facilities. The staff will consider these individuals' past Met-Ed, GPUSC and/or GPUN performance, as well as any relevant current performance, in reaching a decision on any such request. For two individuals (i.e., E. Wallace and G. Kunder) the staff finds that their current positions are not related to a TMI-1 restart decision.

13.3 Staff Position on Revalidation of Management Integrity

Based on all of the information reviewed by the staff and balancing the past improper activities of the licensee against its subsequent record of remedial actions and performance, as well as the record of current senior management of the licensee, the staff concludes that there is reasonable assurance that GPUN can and will conduct its licensed activities in accordance with regulatory requirements and that GPUN can and will operate TMI-1 without undue risk to the health and safety of the public. The staff, therefore, revalidates its position on licensee's management integrity.

Table 13.2 Involvement of individuals in Met-Ed events

Name & Position	Events						Conclusion
	TMI-2 Leakrate	Pre- & Post-Accident Training	False Certification & Management Coverup	Complete & Accurate NOV Response	Timely Provisions of BETA/RHR Faegre & Benson Reports	Harassment of Parks	
R. C. Arnold V.P. GPUSC/ Pres. GPUN	-	-	Yes	Yes	Yes	Yes	None*
J. Herbein V.P. Met-Ed	Yes	Yes	Yes	-	-	-	None*
G. Miller Station Mgr., TMI	Yes	Yes	Yes	-	-	-	None*
J. Floyd Supervisor Operations TMI-2	Yes	Yes	Yes	-	-	-	None*
W. Zewe Shift Supervisor, TMI	Yes	-	-	-	-	-	None*
J. Seelinger Sup. Tech Support, TMI-2	Yes	-	-	-	-	-	None*
G. Kunder Sup. Tech Support, TMI-2	Yes	-	-	-	-	-	None*
E. Wallace Mgr. TMI Licensing	-	-	-	Yes	-	-	None*

*The staff draws no conclusion as to the individual's managerial integrity because the individual is no longer employed by the licensee or is no longer directly involved in operation or licensing of TMI-1.

Yes = Individual directly involved or implicated

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14 ABSTRACT (200 words or less)

Supplement 5 to the Safety Evaluation Report (SER) on TMI-1 Restart documents the review by the Nuclear Regulatory Commission (NRC) staff of nine investigations conducted by the NRC Office of Investigations into matters identified as relevant and material to an evaluation of the licensee's "management integrity." The staff has included, as part of its evaluation, materials from its review of the GPU v. B&W lawsuit record (NUREG-1020LD, "GPU v. B&W Lawsuit Review and Its Effect on TMI-1") as well as other relevant materials developed since the close of the record in the TMI-1 Restart proceeding. In developing its position on General Public Utilities Nuclear Corporation's character (i.e., management integrity), the staff evaluated matters that cast doubt on the licensee's character, individually and collectively; considered the remedial actions taken by the licensee; and balanced past improper conduct of the licensee against its subsequent record of remedial actions and performance and record of current senior management of the licensee. The staff concluded that, while the past improper conduct was grave, the remedial actions taken, the subsequent record of performance, and the record of current senior management support a finding that GPUN can and will operate TMI-1 without undue risk to the health and safety of the public.

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